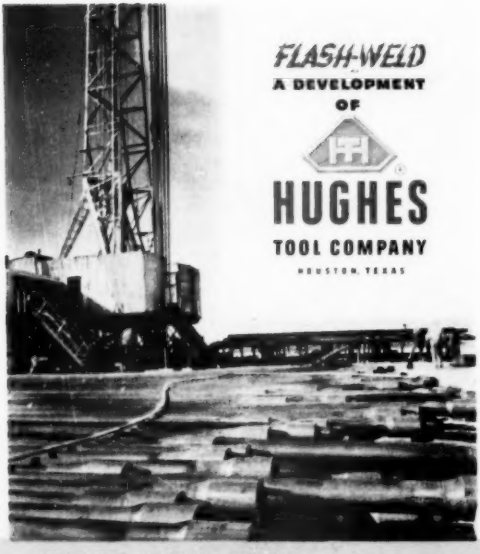
the OIL AND GAS JOURNAL

Are you Discarding Salvageable Drill Pipe?



In these days of drill pipe shortages, it may pay you to take a second and third look before discarding your pipe.

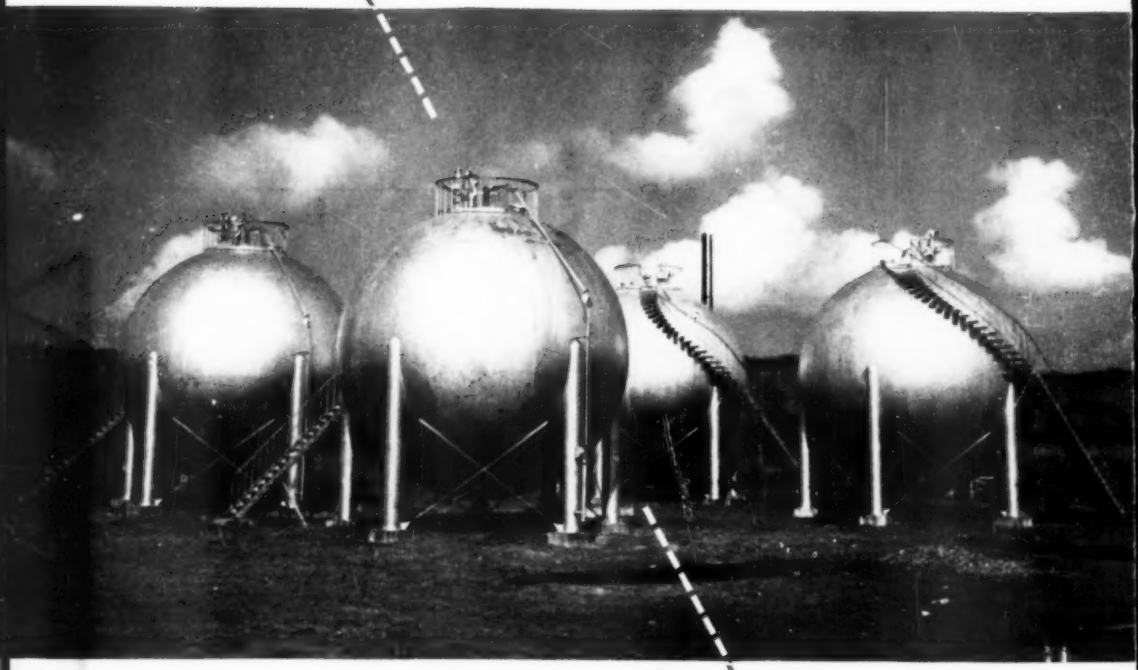
Many operators are now making hole with pipe reclaimed from castoff strings through the use of HUGHES Flash-Weld Tool Joints. These joints eliminate threaded pipe connections and make it possible to incorporate many different types of pipe in a single string. As a result, drill pipe that otherwise would not be used, is now being salvaged.

Regardless of pipe end design, any good drill pipe—with sufficient upset—can be converted into a uniform, dependable drill stem by using HUGHES Flash-Weld Joints.

Ask your HUGHES representative about the cost of unitizing your drill pipe remnants with HUGHES Flash-Weld Tool Joints, the tool joints with the proven performance record!

PRICE 50 CENTS TABLE OF CONTENTS PAGE 51 SEPTEMBER 6, 1951

HORTONSPHERES serve PEMEX

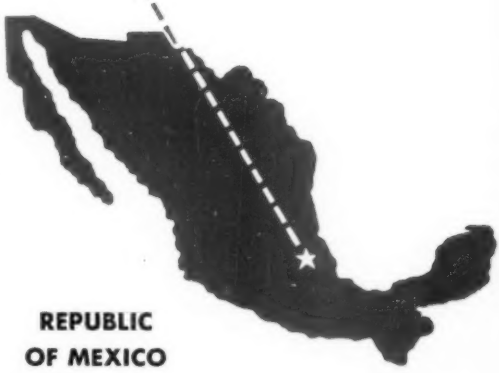


These Hortonspheres, built for Petroleos Mexicanos at Poza Rica, Tampico, Mexico, are more evidence of Latin America's fast growing petroleum industry. In 1950 Pemex boosted its annual production of crude oil by 18.8 per cent. The daily average rose 27,729 barrels.

Hortonspheres are used by many growing refineries throughout the world because they are the natural, most efficient way to store light hydrocarbons. When butane, butane-propane mixtures, natural gasoline or other volatile hydrocarbons are stored in Hortonspheres—none of the contents escape as long as internal pressure does not exceed the setting of the pressure relief valve.

Hortonspheres have several advantages over cylindrical pressure tanks of the same total capacity. Their spherical shape takes less steel to build and normally requires less ground space. Painting and maintenance costs are reduced because there is less surface area per barrel of capacity. They require fewer fittings and piping connections as the unit capacity is larger.

If you would like more information about the advantages of storing light hydrocarbons in Hortonspheres, write our nearest office for Bulletin E. There is no obligation.



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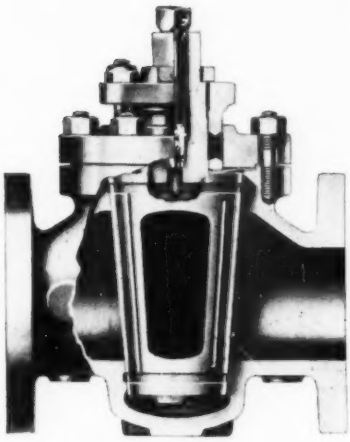
Lubricated

Plug Valves

for TOUGH *assignments*

where tight shut-off...
and easy operation
are "MUSTS"



Walworth Lubricated Plug Valves Offer These Advantages

- Complete surrounding of ports with resistant lubricant affords positive seal against leakage.
- Lubricant grooving system assures ease of operation — tight shut-off — greater protection against corrosion.
- Body and plug fully protected by lubricant from attack by line fluids.
- Quarter turn opens or closes valve.
- Made in a complete range of sizes ½" to 26" and for pressures from 175 to 5,000 psi., and for vacuum requirements.

For handling petroleum products, natural or manufactured gas, acids, alkalies, solvents, slimes, slurries . . . in fact for almost any hard-to-handle liquids—there's a Walworth Lubricated Plug Valve designed for the job.

Easy to operate, tight sealing, resistant to wear and corrosion, Walworth Lubricated Plug Valves assure long years of dependable service at low operating cost.

Walworth Lubricated Plug Valves are available in sizes ½" to 26" for pressures from 175 to 5,000 psi., and for vacuum requirements. For full details—prices, sizes, dimensions, and other pertinent data, see your Walworth distributor or write to:

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Built Up..

to Oil Field Standards!

Fairbanks-Morse 8-Cover Side-Pot Duplex Power Pumps are built *UP* to the rugged design and conservative standards of oil field pump practice . . . built *UP* to last . . . built *UP* to liberal strength and safety factors.

They are not built down to achieve lighter weight with consequent sacrifice in design, materials and dependability. Light weight in an oil field power pump is a dubious advantage at best. Strength and service are the important considerations.

When you want dependable, efficient, long-life, low-cost service, your choice should be Fairbanks-Morse, the power pumps that set performance and economy records wherever they are used. Fully bronze-fitted, oil-fitted, or slush-fitted styles. Fairbanks, Morse & Co., Chicago 5, Ill.

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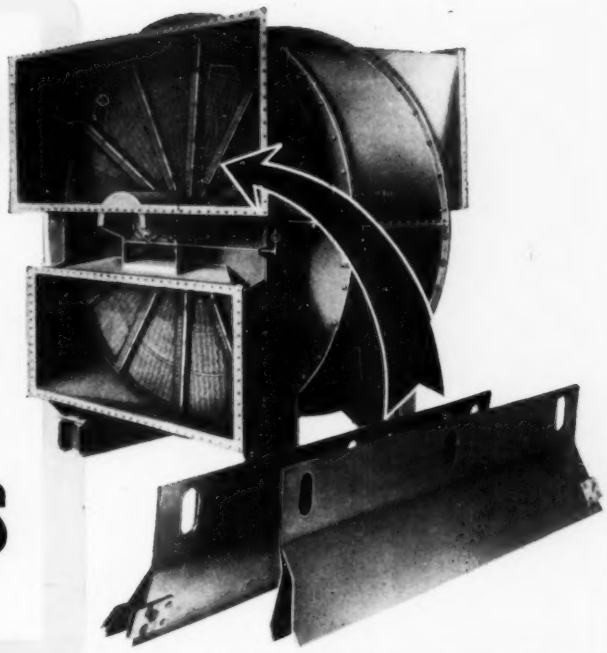
Eliminates 3 to 6 Costly Shutdowns



In general, corrosion in air preheaters occurs at the seals on the cold end, where corrosive sulphides and chlorides condense from hot flue gases on the cold metal. At this key point, HASTELLOY alloys last 3 to 6 times longer than other metals.

Air Preheater Seals of HASTELLOY Alloy Last 1½ to 2 Years in Presence of Sulphides, Chlorides, and Metallic Compounds

Use of preheated air has resulted in considerable savings at several refineries where HASTELLOY alloy has helped to eliminate the severe corrosion problem often encountered at the cold end of the preheater units. The radial, circumferential, and post seals ordinarily used in this service leak and overload blower motors after only 3 to 6 months because of the corrosive flue gases, which condense when they strike the cold metal. Before the refineries switched to HASTELLOY alloy, maintenance and replacement costs frequently canceled out much of the saving in fuel consumption and other advantages of reclaiming waste heat from most reaction processes.

Seals made from HASTELLOY alloy are not readily attacked by the refinery gases, which usually contain sulphides and chlorides, as well as compounds of vanadium, arsenic, and other metalloids and metals. Equipment can be run continuously for as long as 18 months to 2 years without shutdown for the replacement of seals.

For complete data on HASTELLOY alloys, write for the 40-page booklet, "HASTELLOY High-Strength, Nickel-Base, Corrosion-Resistant Alloys."

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With today's delays in replacements, dollars offer less and less protection when tools or equipment wear out. No chance of cut-backs, or loss of day-to-day production, if wearing areas are fully protected with Airco Hardfacing Alloys . . . new parts and old stay on the job longer—even at peak production.

No matter what the part, or tool . . . fishtail bits . . . roller bits . . . core heads . . . wall scraper blades . . . drag type drilling bits . . . their life is extended many times by using Airco Tung Tube.

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Wear is a serious problem in your operations! It will pay you to investigate Airco Hardfacing Alloys. An Airco representative will be glad to give you complete information. Get in touch with your local Airco office today.

a few AIRCO hardfacing alloys

AIRCOLOY® No. 1

A non-ferrous, hardfacing alloy consisting of cobalt, chromium and tungsten . . . excellent corrosion resistance . . . retains hardness and wear resistance even at red heat . . . cold hardness of 53 to 57 on Rockwell "C" scale. May be used wherever heat, abrasion and corrosion are involved. Aircoloy No. 1 is furnished bare for oxyacetylene application and coated for electric arc welding.

AIRCOLOY® No. 6

Excellent corrosion resistance . . . high impact and good wear resistance with some degree of ductility . . . retains hardness and wear resistance at red heat . . . cold hardness of 43 to 47 Rockwell "C". May be used wherever heat, impact, abrasion and corrosion are involved.

AIRCOLITE No. 59

These cast alloy rods are recommended for application wherever abrasion resistance is particularly important. Deposits acquire a high polish in service, and maintain their high hardness at temperatures up to 800° F. Applied either electrically or by gas process. Deposits test from 54-59 on Rockwell "C" scale.

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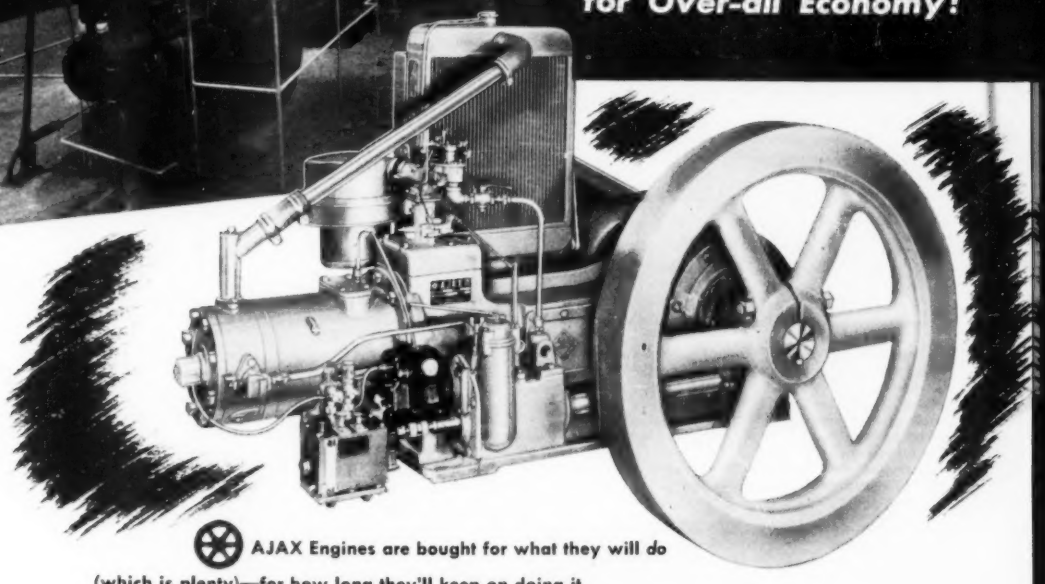

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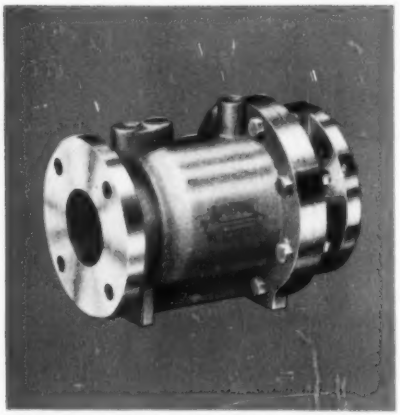
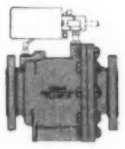


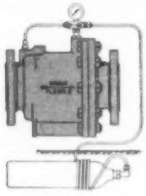
Far simpler operation and maintenance with versatile Flexflo Valves

FLEXFLO Valves are basically diaphragm-operated, using an expansible tube as both diaphragm and valve. With only four simple parts including but one non-metallic moving part, Flexflos assure long, trouble-free service with minimum attention. Field replacement of the simple tube-core assembly affords new valve performance in a matter of minutes. Depending upon the operating system used, positive-acting Flexflos give highly efficient service as:

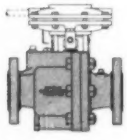
BACK PRESSURE REGULATORS
PRESSURE REDUCING REGULATORS
PRESSURE RELIEVERS
CONSTANT FLOW VALVES
SEPARATOR OIL VALVES
REMOTE CONTROL VALVES
AUTOMATIC SHUT-OFF VALVES
. . . and many other applications.



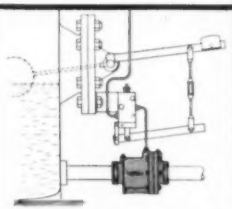
Model 80-41F. Solenoid-operated Flexflo for on-off service.



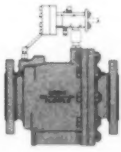
Model 888. Flexflo Dome Pressure Loaded Reliever for back pressure or relief service.



Model 898. High pressure Separator Oil Dump Valve for operation from level pilot.

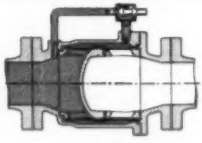


Model 80-899. Separator Oil Dump Valve for operation from float lever.



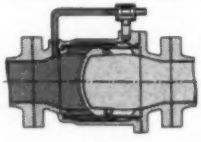
Model 80-42F. Pressure-operated Flexflo for on-off service.

flexflo lets pressure do the work:



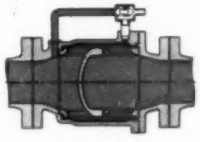
CLOSED

1 The only moving part in the Flexflo Valve is a tough Buna N tube stretched over a cylindrical slotted metal core. When closed, line pressure from within, tending to force tube off core, is opposed by equal jacket pressure. Tension of the tube itself forms a positive, bubble-tight seal. The tube conforms to uneven surfaces and is hence unaffected by foreign matter or erosive wear.



THROTTLING

2 As jacket pressure is reduced, line pressure begins to roll the tube off the core, opening the valve. Throttling is smooth and even. The Flexflo reacts instantly to the slightest pressure variations, compensating automatically for surge or shock impulses. Stability at all flow positions is accurately maintained. Fluttering and chattering are reduced to a minimum.



OPEN

3 When all jacket pressure is removed, the tube is forced completely off the core and the valve assumes its wide open position. Full flow capacity with minimum pressure drop is assured. As Flexflo employs no hinge-pins, guides or other metallic moving parts, no troublesome problems of corrosion or wear are encountered. It cannot stick, wedge or slam.

GROVE

Grove Flexflo Valves and Regulators are adaptable to air, gas, oil, water and other fluids at temperatures to 150° F. Available in iron or steel, sizes 1" to 12", for working pressures up to 1500 psi. Wire or write for full details.

***flexflo* VALVES and REGULATORS**

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with the Exclusive Goodyear Rotary Hose Fitting

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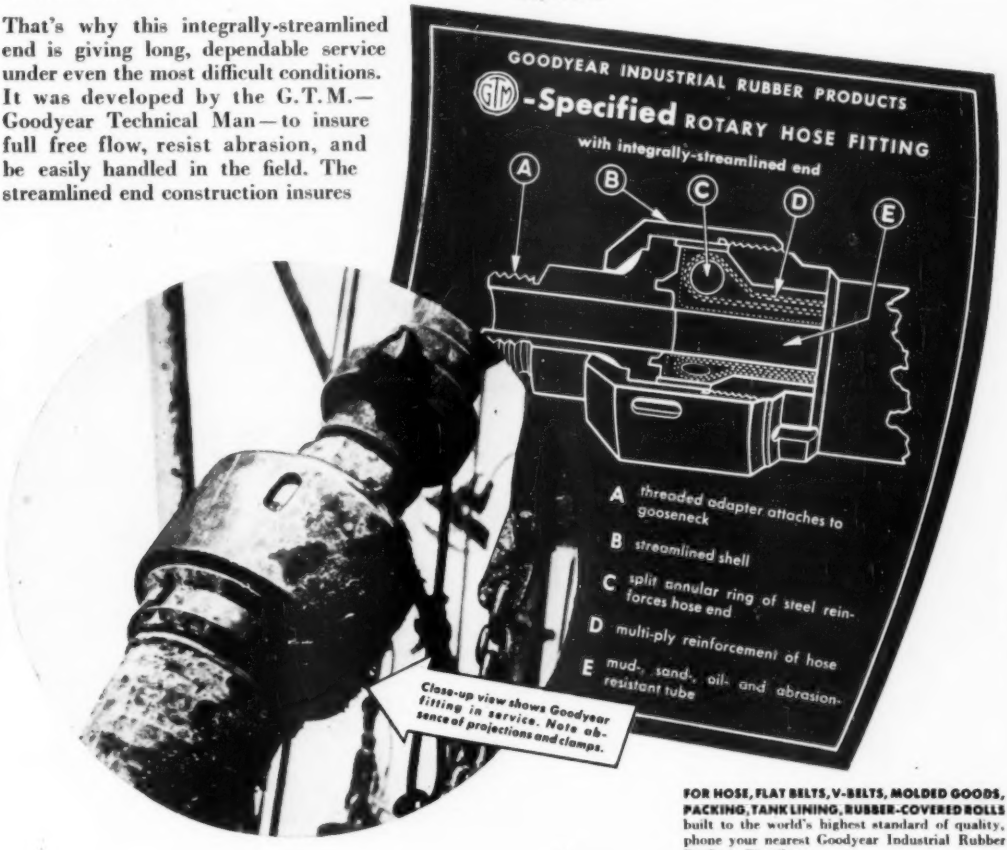
That's why this integrally-streamlined end is giving long, dependable service under even the most difficult conditions. It was developed by the G.T.M.—Goodyear Technical Man—to insure full free flow, resist abrasion, and be easily handled in the field. The streamlined end construction insures uniform strength and flow, along the entire length of the hose, elimination of enlarged ends and outside clamps that catch on the rig to cause costly jams at the head end.

Ask the G.T.M. for details, see your nearest Goodyear Distributor, or write Goodyear, Akron 16, Ohio.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GTM-Specified ROTARY HOSE FITTING
with integrally-streamlined end
A
B
C
D
E
A threaded adapter attaches to gooseneck
B streamlined shell
C split annular ring of steel reinforces hose end
D multi-ply reinforcement of hose
E mud-, sand-, oil- and abrasion-resistant tube
Close-up view shows Goodyear fitting in service. Note absence of projections and clamps.

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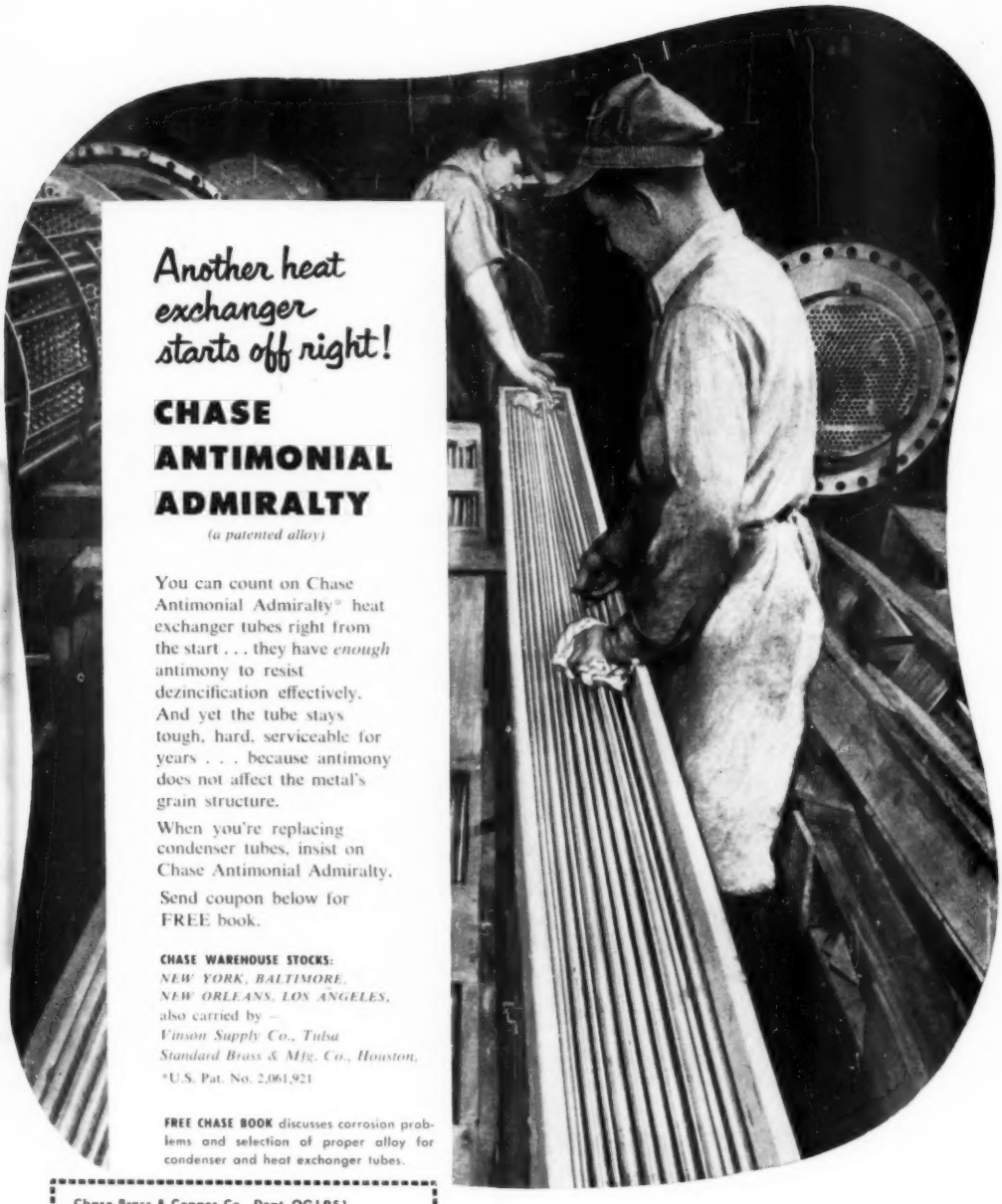

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You can count on Chase Antimonial Admiralty* heat exchanger tubes right from the start . . . they have *enough* antimony to resist dezincification effectively. And yet the tube stays tough, hard, serviceable for years . . . because antimony does not affect the metal's grain structure.

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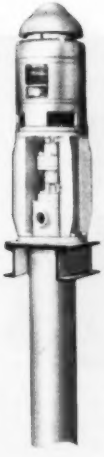
CHASE 75th ANNIVERSARY 1876 1951

Boiling point temperatures and limited NPSH pose no problem for these VMT pumps!

WHEN PUMPING FLUIDS at boiling point temperatures, the problem of sufficient net positive suction head often requires expensive installation to raise the vessel from which the pump would draw or to excavate a pit to lower the pump.

This is eliminated with the BJ "VMT" pump because the vertical multi-stage pumping unit is mounted in a barrel from which it takes a suction. The base of the pump is at ground level while the length of the barrel is determined by the NPSH requirement.

The "VMT" pumps (shown above) serving as boosters from gasoline tank farm to main line stations are just one of the many successful applications for refineries, pipe lines, fueling stations, power plants, and process industries. For more detailed information on how the "VMT" may solve your pumping problem, call your local BJ sales office or send the coupon below.



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- Capacities to 5000 gpm. Heads to 250 psi. Temperatures from sub-zero to 750° F.
- Handles corrosive or non-corrosive liquids
- Radial forces balanced at all speeds
- Adjustable coupling for easy, accurate impeller setting

Also available in the smaller "VLT" model (capacities to 110 gpm). Provides the same basic construction and installation advantages as the "VMT," yet is priced for general purpose application.

Byron Jackson Co.

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BJ Pump Division, Dept. 26
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Whether you want one worm gear speed reducer or a thousand, a standard drive or a unit designed to meet special problems . . . Cleveland is always at your service.

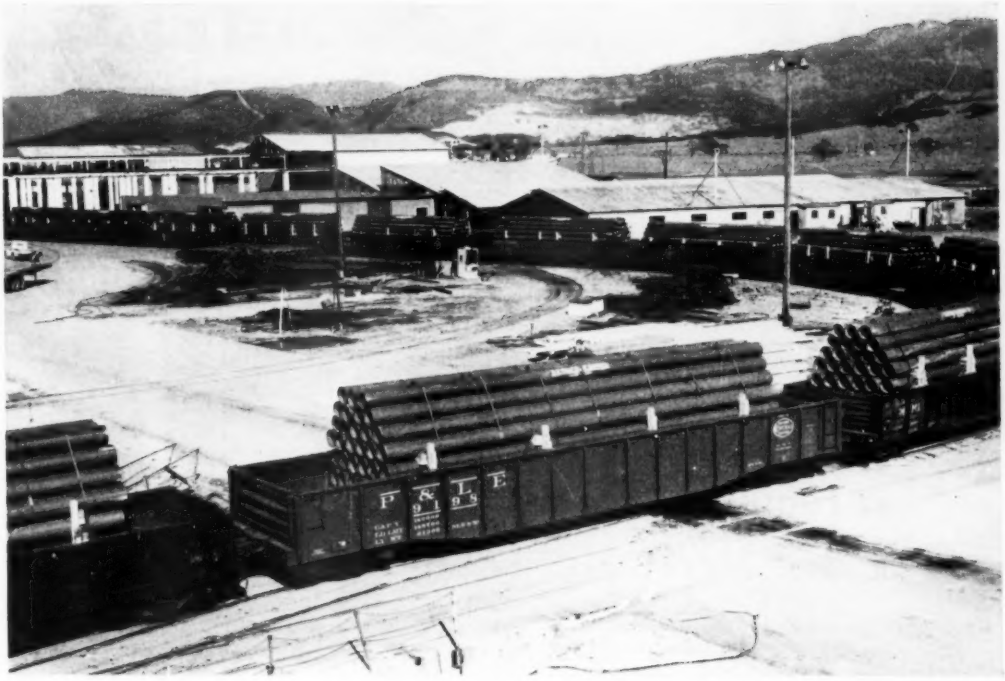
Dependability—Cleveland ingredient beyond price

● It is not surprising that Cleveland drives installed 35 years and more ago are still in service. Units built in the early years of the Company's history continue to operate dependably today with minimum attention.

There are reasons for the outstanding performance that is synonymous with the name Cleveland. From its start in 1912, this Company concentrated its entire engineering and manufacturing effort on the worm gear drive. It has always emphasized four factors—correctness of design, finest quality materials, up-to-date manufacturing facilities and precision workmanship. As a result, the durability, performance and efficiency of worm gearing have been raised to new heights. The worm gear drive—and Cleveland in particular—affords measurable savings—in life-time cost, in low maintenance and in lasting satisfaction.

Write for the new Cleveland Catalog for specifications and other details of the complete Cleveland line. The Cleveland Worm & Gear Company, 3286 East 80th Street, Cleveland 4, Ohio.

Affiliate: The Farval Corporation, Centralized Systems of Lubrication. In Canada: Peacock Brothers Limited.



ON TIME!

This is one of the trainloads of Basalt-Kaiser steel line pipe that was shipped from Napa, California, to the Platte Pipeline—the line that will carry oil from the Rockies of Wyoming to the St. Louis area.

Like *all* Basalt-Kaiser steel line pipe used on this job, it was delivered *on time*—helping to speed construction of this important line.

It's one more indication of Kaiser Steel dependability—one more reason why experienced pipeline companies know that...

It's good business to do business with

Kaiser Steel

KAISER STEEL PIPE SPECIFICATIONS • All pipe manufactured to latest A.S.T.M. and A.P.I. specifications

Type	Diameter	Length	Wall Thickness	Shipping Point
Continuous Weld—Threaded and Coupled	½" to 4" nominal I.D.	Uniform 21'	Standard	Fontana, Calif.
Continuous Weld—Plain End	2⅜" to 4½" O.D.	Up to 40'	Standard	Fontana, Calif.
Electric Resistance and Fusion Weld—Plain End	8⅝" to 20" O.D.	Up to 40'	.188" to .500"	Napa, Calif.—Basalt-Kaiser
Electric Resistance Weld—Plain End	5⅝" to 12¾" O.D.	Up to 55'	.188" to .400"	Fontana, Calif.
Electric Fusion Weld—Expanded—Plain End	22" to 30" O.D.	Up to 40'	.188" to .500"	Napa, Calif.—Basalt-Kaiser

Prompt, dependable delivery at competitive prices • KAISER STEEL CORPORATION Los Angeles, Oakland, Seattle, Portland, Houston, Tulsa, New York

Garlock
"Chevron" Seal

Wherever leakless operation is required—specify GARLOCK Mechanical Seals

When leakless operation of centrifugal or rotary pumps is required—particularly, if corrosive or inflammable liquids are being handled—GARLOCK Mechanical Seals will do the job.

These seals are composed of two main elements; one rotates with the shaft and the other is stationary. Since the stationary element does not contact the shaft, there is *no* wear on the shaft. A positive contact between carefully lapped metal-to-carbon or, metal-to-metal mating surfaces provides the leakless seal.

Users of GARLOCK Mechanical Seals have reported outstanding service records on a wide variety of applications. Here are just two taken from the many in our files:

- Over 3 years' service and still in operation, on a 1¾" shaft of a boiler feed pump handling water at 220°F. and 200 p.s.i., and operating at 3600 r.p.m.
- Two years' service, and still in operation, on a 1" shaft of a pump handling paint at 130°F., 10' Hd., operating at 1750 r.p.m.

GARLOCK manufactures mechanical seals in many standard and special designs from a wide range of high quality materials. For more information, write for our Mechanical Seal booklet or call your GARLOCK representative.

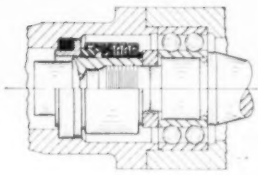
THE GARLOCK PACKING COMPANY
PALMYRA, NEW YORK

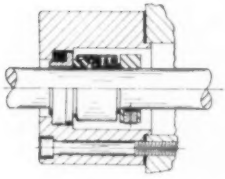
Tulsa, Okla. Houston, Tex.
Los Angeles, Calif.

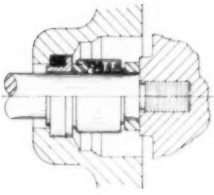
GARLOCK

TYPICAL APPLICATIONS of GARLOCK Mechanical Seals for Rotary Shafts

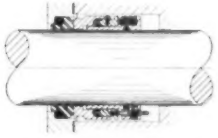
PACKAGE SEALS





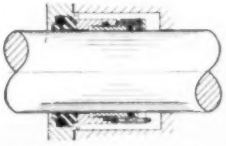


CHEVRON-TYPE SEALS



Type CB—Balanced "Chevron" Seal

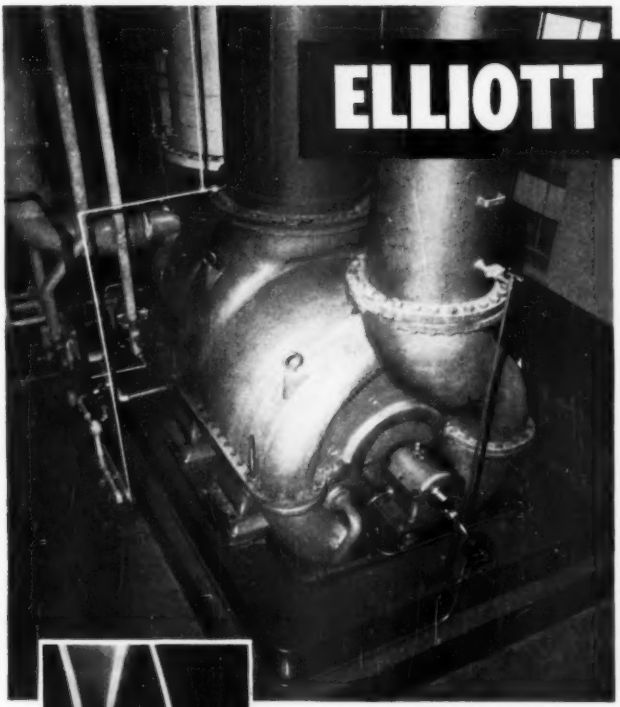
"O" RING SEALS



Type OB—Balanced "O" Ring Seal

Cat cracking calls for the "year-round" service of

ELLIOTT BLOWERS



WELDED IMPELLERS are one of the many reasons why Elliott blowers are getting ever-increasing acceptance for process work. Note the smooth contours, heavy blades, and generally rugged construction (as compared to conventional riveted impellers). These impellers are completely homogeneous and can be made of any weldable material having reasonable mechanical strength.

CONTINUOUS AND reliable performance is an established characteristic of Elliott centrifugal blowers. This is proven in numerous modern refineries where large quantities of air are required for conveying and regenerating catalyst.

The blower installation pictured is typical. Serving an important mid-west refinery, it is rated at 30,000 inlet cfm, compressing air to a discharge pressure of 26 psig. Day and night this blower is driven at 4750 rpm by an Elliott direct-connected 3140-hp condensing steam turbine.

In recent months an Elliott blower in cat cracking service broke all records for continuous operation —677 days. The previous non-stop record of 610 days was also held by an Elliott blower. Performance like this spells *profit*.

HALF CENTURY OF 1901 EC 1951 POWER PROGRESS

ELLIOTT COMPANY

Centrifugal Blower Dept. • JEANNETTE, PA.

Plants at: JEANNETTE, PA. • RIDGWAY, PA. • AMPERE, N. J. • SPRINGFIELD, O. • NEWARK, N. J.

DISTRICT OFFICES IN PRINCIPAL CITIES

P-1093

Elliott Blowers—*the heart of the cat cracker*

flexible design

for complete range

of working pressures

and depth ratings

Safety, dependability and interchangeability are built into the "National Blue" line of Well Head Equipment. Precision machining, gauging, and testing assure a product that always gives the service required, and more.

The design flexibility of National Well Head Equipment provides the size, capacity and type needed for each individual well. Assembly is simplified by self-locating parts which are self-activating. Advanced hydraulic testing methods insure sound seals.

National's Well Head Equipment is available in the complete range of working pressures and depth ratings. Get the facts from your National Supply Representative.

THE NATIONAL SUPPLY COMPANY

GENERAL SALES OFFICES: TOLEDO, OHIO

DIVISION OFFICES: Casper; Ft. Worth; Houston; Pittsburgh; Tulsa; Torrance
CANADA: The National Supply Company, Limited, Room 202, Alberta Block, Calgary, Alberta
EXPORT: National Supply Export Corporation, 600 Fifth Avenue, New York 20, N.Y., U.S.A.; River Plate House, 12 South Place, London, E.C.2

NATIONAL BLUE PRODUCTS

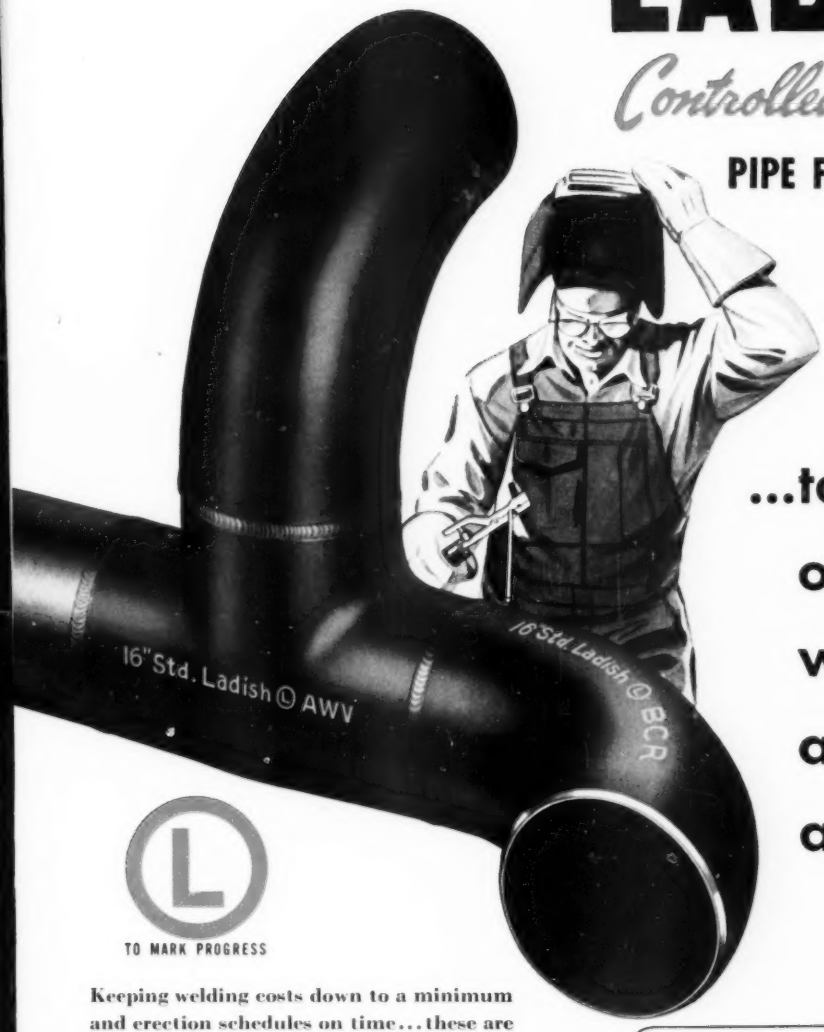
NATIONAL OIL FIELD MACHINERY & EQUIPMENT • SPANG STEEL PIPE • SUPERIOR & ATLAS ENGINES

IT ALWAYS PAYS TO SPECIFY

LADISH

Controlled Quality

PIPE FITTINGS



...to be sure of sound welds and fast assembly

TO MARK PROGRESS

Keeping welding costs down to a minimum and erection schedules on time... these are important advantages you can assure to any piping job by installing Ladish Controlled Quality fittings. Metallurgical controls over materials and methods provide an assurance of uniform weldability in every Ladish fitting... and thorough inspection to rigid standards of physical dimensions and geometric accuracy assures fast piping assembly.

THE COMPLETE *Controlled Quality* FITTINGS LINE
PRODUCED UNDER ONE ROOF... ONE RESPONSIBILITY

LADISH CO.

CUDAHY, WISCONSIN
MILWAUKEE SUBURB

District Offices: New York • Buffalo • Pittsburgh • Philadelphia • Cleveland • Chicago • St. Paul
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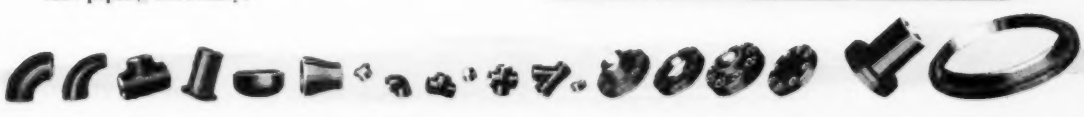


PARKERSBURG HYRECO

UNMATCHED for boosting condensate recovery

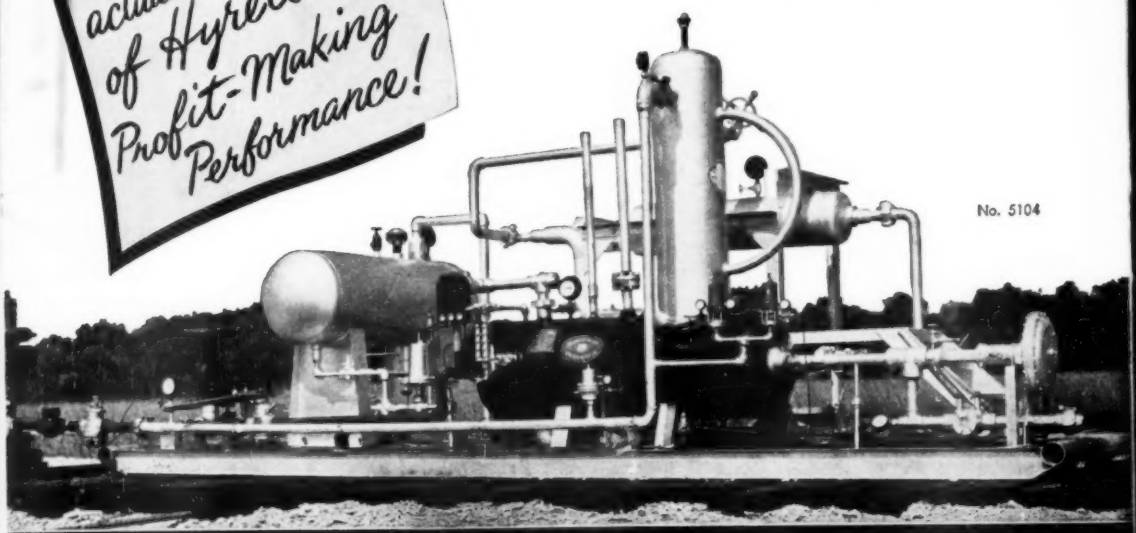
UNMATCHED for increasing revenue

Ask your Parkersburg representative to show you the actual case histories of Hyreco Profit-Making Performance!

Each Hyreco installation adds to the record of successful performances which this high pressure gas condensate processing unit is establishing. In every case the operator has been able to recover more condensate . . . substantially increase revenue from his gas wells . . . lower operating cost by prevention of line freezing trouble and expense.

No similar equipment available today can process high pressure gas at such low temperatures . . . recover such a high percentage of condensate and pay for itself in such a short time. You owe it to yourself to get all the facts about the revenue-increasing possibilities with Parkersburg Hyreco.

PARKERSBURG RIG & REEL CO.
PARKERSBURG, WEST VA.



No. 5104

PARKERSBURG
PRESSURE EQUIPMENT

HORIZONTAL AND VERTICAL SEPARATORS • HYRECO • HYDRACEPTER • SCRUBBERS • TREATERS • HEATERS

Manufactured in Houston, Texas

Here is a magneto that controls explosive fumes with "flame-proof" ventilation. The special ventilating arrangement of the Bendix Low-Tension Magneto permits air laden with explosive fumes to enter the magneto for ventilation without danger of igniting the surrounding air. Kits are also available to convert magnetos now in use to the "flame-proof" ventilation type.

In addition to this important safety feature Bendix Low-Tension Magnetos actually reduce engine maintenance and operating costs. For example, spark plug erosion is reduced to a minimum. The distribution of low tension voltage to the high tension coils is through a series of breaker assemblies, thus eliminating trouble often experienced with the conventional distributor. Variable or fixed sparks can be obtained by internal adjustment.

For safety and low operating costs it will pay you to specify Bendix Low-Tension for all your magneto requirements. Complete data available on request.

- **Low Plug Erosion Rate**
- **Breaker Type Distributor**
- **Ventilation without Fire Hazard**
- **Radio Shielding Available**
- **Variable or Fixed Ignition**

Bendix

SCINTILLA MAGNETO DIVISION OF
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Export Sales: Bendix International Division, 72 Fifth Avenue, New York 11, New York

Bendix
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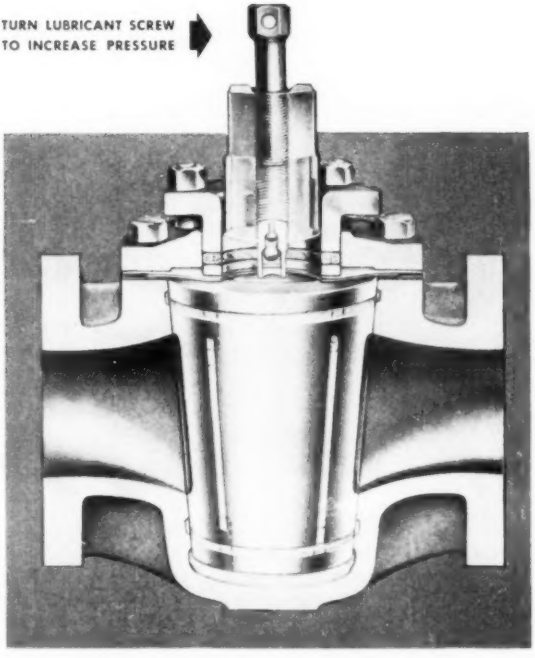
Having valve trouble?

Install the valve

with

unexposed seat

If leaking valves are fouling your oil lines the most likely reason is seat failure. But corrosion and erosion of the valve seat *can* be resisted. The seat of a Nordstrom valve is never exposed to the line. It is permanently lubricated. The plug cannot separate from its seat. Pressurized lubricant forms a seal around each port. The valve is automatically lubricated by using Hypermatic, the miracle lubricant.



AVAILABLE IN SEMI-STEEL, STEEL, STAINLESS STEEL, BRONZE, MERCOLOY, NICKEL AND SPECIAL ALLOYS

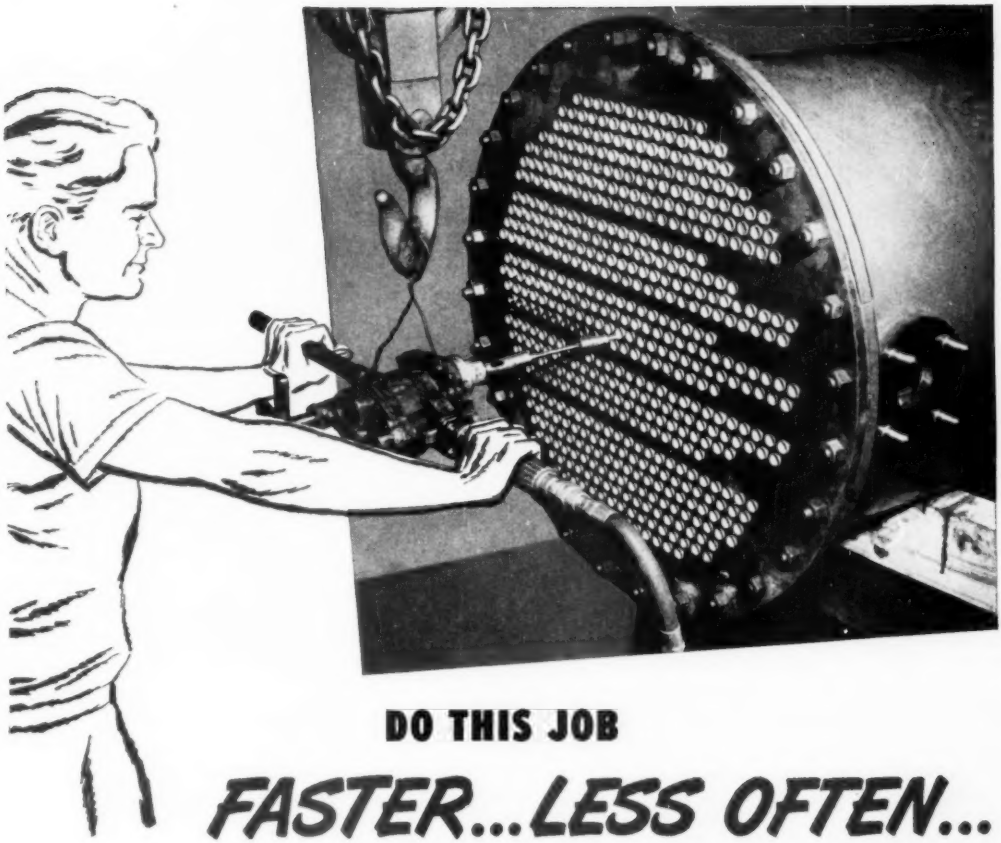
Nordstrom VALVES

NOW AUTOMATICALLY LUBRICATED *WITH*

Trade Mark Hypermatic Pats. Applied for

ROCKWELL MANUFACTURING COMPANY

400 N. Lexington Avenue, Pittsburgh 8, Pennsylvania • Offices in all principal cities



DO THIS JOB

FASTER...LESS OFTEN...

with ELECTRUNITE HEAT EXCHANGER TUBES

Reduce off-stream time for retubing . . . lengthen the time between retubings . . . Republic ELECTRUNITE Heat Exchanger Tubes give you both these benefits. Fully-normalized structure assures uniform ductility for fast, smooth roll-in. Cold forming provides clean, scale-free surfaces that assure maximum service life. Carbon steel and several stainless steel analyses are made in a wide range of sizes and gages. Write for complete data to

REPUBLIC STEEL CORPORATION
STEEL AND TUBES DIVISION
224 EAST 131st STREET • CLEVELAND 8, OHIO

Republic
REPUBLIC STEEL
ELECTRUNITE
STAINLESS STEEL TUBING AND PIPE

Proof

. . . that AEROTEC GAS SCRUBBERS *Really* clean gas

The Vertical Aerotec Gas Scrubber sectioned to show Aerotec tubes, heart of this new scrubbing principle.

This pilot installation at Alice, Texas, used on very dry gas, was first installed on the discharge of a conventional type gas scrubber (position of first installation shown by arrows). In 18 hours of operation, this Aerotec unit collected 2 quarts of liquid, from gas that had passed through the conventional unit.

Installed at the inlet to the conventional gas scrubber, only one teacup of fluid was collected from the conventional type in 8 days, and this was probably condensation.

This is a typical example of field reports on the high efficiency of Aerotec gas scrubber units. Based on a modification of the principle of separation used in dust collection, Aerotec units have produced outstanding results, both at the well and on pipeline applications.

A catalog on operating and application data will be sent on request. Just write our Project Engineers, or the field office nearest you.

Project and Sales Engineers

THE THERMIX CORPORATION

Greenwich, Connecticut

(Offices in 28 Principal Cities)

Canadian Affiliates: T. C. CHOWN, LTD., 1440 Saint Catherine St., W., Montreal 25, Quebec; 50 Abell St., Toronto 3, Ontario

THE AEROTEC CORPORATION

GREENWICH, CONN.

AEROFIN

Heat-Transfer Surface

Aerofin is sold only by manufacturers of nationally advertised fan system apparatus. List on request.

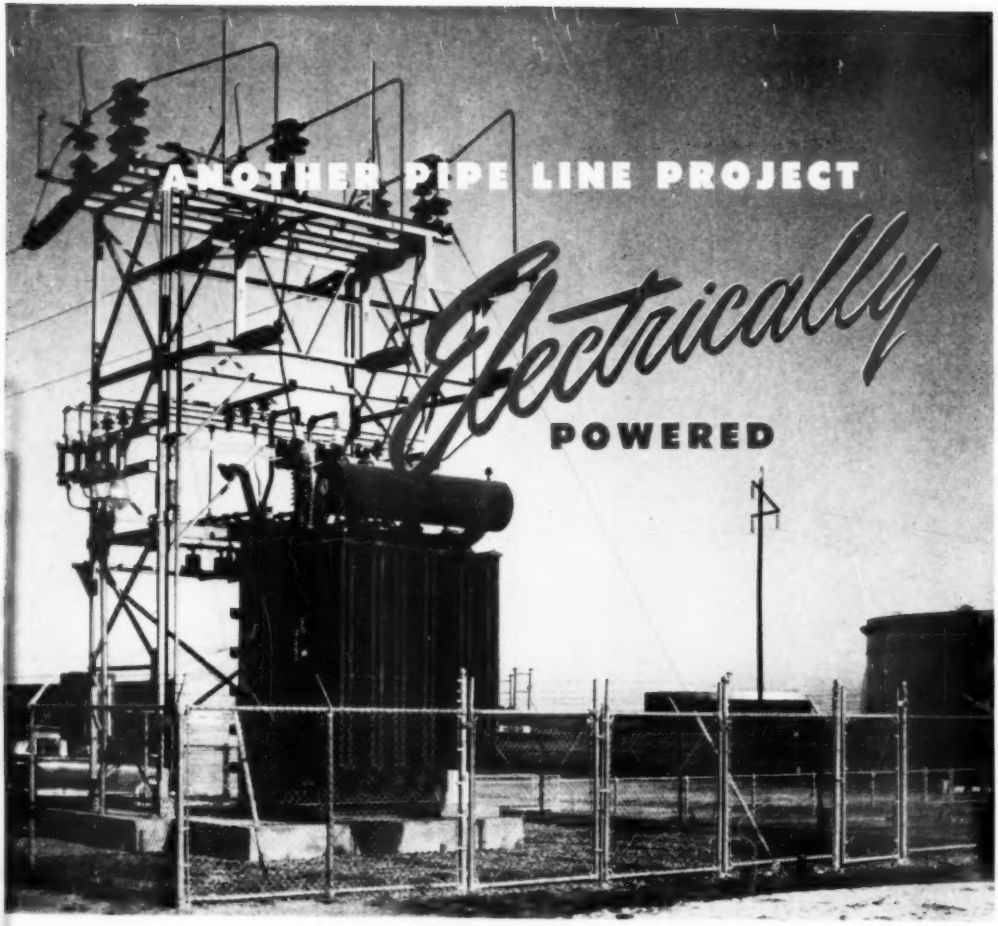
● High Efficiency
● Long Service Life
● Low Maintenance Costs

You are assured of high efficiency in heating or cooling — long service life — low maintenance and service costs, when you specify Aerofin extended-surface heat exchangers.

The reason is obvious: Aerofin makes heat exchangers *exclusively* — offers you the results of unequalled experience, unequalled production facilities, unequalled materials testing and design research — and the guidance of a complete, highly skilled engineering staff, at the plant and in the field.

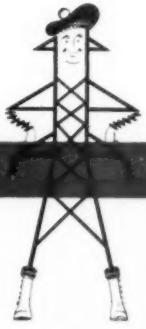
For the most practical solution to your heat-exchange problem, ASK THE AEROFIN MAN.

AEROFIN CORPORATION
410 South Geddes St.
SYRACUSE 1, N. Y.



More and more pipe lines are using low-cost Purchased Electric Power in their pumping stations. Your power company is better equipped to give you better service at a lower cost than ever before! ECONOMICAL? *PEP cuts down installation, operating, maintenance, and labor costs! CONVENIENT? With *PEP you have constant, dependable service, automatic controls, a smoother and more satisfactory, trouble-free operation. Call the Power Engineer of your Utility Electric Company—he will give you complete details on *PEP.

*PEP – Purchased Electric Power



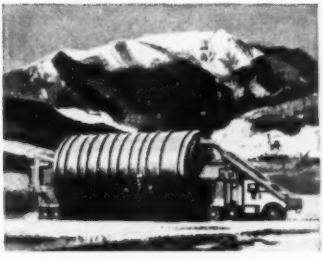
Petroleum Electric Power Association

ORGANIZED IN THE INTEREST OF GREATER SERVICE TO THE PETROLEUM INDUSTRY

CALL YOUR NEAREST ELECTRIC SERVICE COMPANY FOR MORE FACTS

THEY CALL IT "HIGHPOCKETS"

1. **Spreading its ribs,** this trailer (called "Highpockets" by its designers) gingerly picks up a 40-foot section of 23-foot diameter steel pipe, hauls it eight miles and installs it in the Lucky Peak Dam in Idaho. The trailer has to be steered from both a front cab and a rear caboose, like a hook-and-ladder.



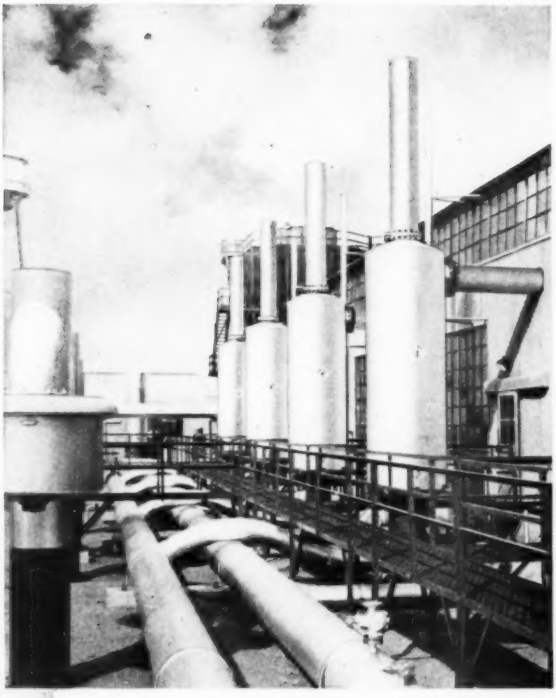
2. **To put this "tunnel" on wheels,** rings contract as trailer backs into pipe, then expand to grip and lift the load. "Highpockets" is an example of scientific development to solve a rugged transportation problem. The latest scientific development to solve the problem of rugged driving is new Conoco Super Motor Oil.

3. **50,000 Miles—No Wear!** After a punishing 50,000-mile road test, *with proper drains and regular care,* engines lubricated with new Conoco Super Motor Oil showed *no wear of any consequence:* in fact, an average of less than one one-thousandth inch on cylinders and crankshafts. Gasoline mileage for the last 5,000 miles was actually 99.77% as good as for the first 5,000. Proof that New Conoco Super, with OIL-PLATING, can keep your new car *new!*

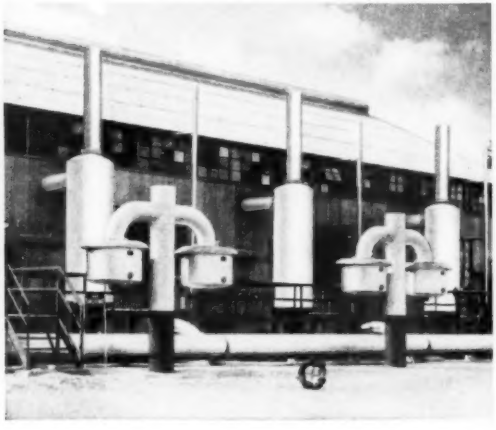
Now in its 76th year, Continental Oil Company is still a leader in oil research and a pioneer in oil-perfecting additives, with more than 100 patents on discoveries that improve performance and lengthen the life of your car.

© 1951 **CONTINENTAL OIL COMPANY**

Large Compressor Station uses Burgess-Manning Snubbers for *Quiet Operation*



New type Burgess-Manning SDL-20 Side Inlet Exhaust Snubbers on Cooper-Bessemer Model GMW-6 1440 hp gas engine compressors at a Texas natural gas pipe line station.



● The management of this outstanding compressor station called on Burgess-Manning for the installation of their Snubbers to quiet the exhaust roar of huge gas engines. Burgess-Manning, with a quarter century's progressive research work and extensive field experience, has earned an enviable reputation in industry as a leader in engine exhaust and compressor intake noise reduction; and as a specialist in surge control in compressor gas and air line systems. For a solution to these problems, consult with Burgess-Manning.

BURGESS-MANNING COMPANY

749 East Park Avenue, Libertyville, Ill.
1203 Dragon Street, Dallas, Texas

Not a bad apple in the lot!

In the most complete ONE-STOP supply service every item offered must be good. You'll find no bad apples in a Jones & Laughlin Supply store. Major items of supply and equipment include these famous names:

- J&L Tubular Goods and Wire Rope
- AXELSON Sucker Rods and Bottom Hole Pumps
- CABOT Pumping Units
- WHELAND Drilling Equipment
- REPUBLIC RUBBER Hose and Belting
- AMERICAN BRAND Cordage
- WILSON Drilling Rigs
- BYRON JACKSON Tongs, Elevators, Hooks, Links
- BAROID Drilling Muds
- MIDWEST Welding Fittings
- YOUNG Jacket Water Coolers
- WALWORTH Valves and Fittings
- CENTURY Motors
- FAIRBANKS-MORSE Engines
- LINEAR Packing
- RATIGAN "Sure Grip" Pumping Equipment
- UNIT Drilling Rigs
- FRANKS Well-Servicing Units

. . . here's My warehouse!"

Jones & Laughlin Supply Company

Subsidiary of Jones & Laughlin Steel Corporation

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General Offices: TULSA, OKLAHOMA

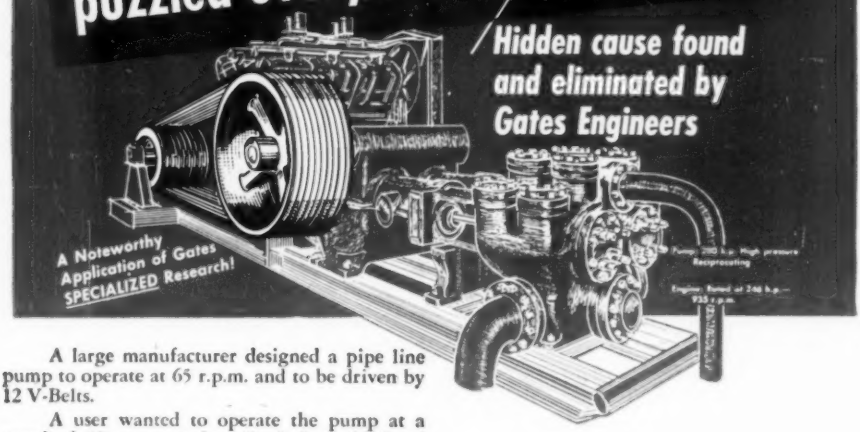
J&L STEEL

82 Stores -- 17 Offices -- 6 Resident Salesmen

AMERICA NEEDS SCRAP TO MAKE MORE STEEL

Severe vibration on pump drive puzzled everyone . . .

Hidden cause found and eliminated by Gates Engineers



A large manufacturer designed a pipe line pump to operate at 65 r.p.m. and to be driven by 12 V-Belts.

A user wanted to operate the pump at a speed of 90 r.p.m. and realized that additional horsepower would be required. Upon checking the V-Belt drive, it was found that the additional belts required would increase the face width of the sheave and therefore the moment arm of the bearing load. Any increase in bearing load combined with the increased speed was distinctly undesirable and therefore the user sought some means of reducing the overhung weight and width of the sheave.

Learning that a *special* V-Belt had a sufficiently higher horsepower rating to gain the greater pump speed with *only 9 belts*, he had the drive re-designed to use these belts.

When installed on the job, the belts vibrated severely. At a speed somewhat below the desired range, the belts would fly completely off the sheaves. Operation was so rough that it was almost impossible to run the pump at all.

Gates Engineers were called in for consultation. Their analysis indicated that the particular belts used formed a *too-compliant* link between the pump and the engine. This allowed tortional vibration to build up to excess. Therefore, belts of *less compliance* would have to be used.

Accordingly, Gates Engineers wrote specifications for belts having the necessary h.p. rating but with the exact *degree of compliance* that would avert the vibration. These special V-Belts were built by Gates—installed—and the drive operates smoothly under all loads and at all speeds within the range.

The excessive vibration is gone. The clutch operates smoothly at any speed. And 13 additional pumps have since been equipped with identical belts—all operating most satisfactorily.

Gates ability to analyze and correct obscure drive difficulties is no accident—for Gates operates the largest V-Belt Testing Laboratories in the world. And Laboratory findings are carefully checked by tests made under actual field conditions. Finally, the *results* of these exhaustive tests are immediately reduced to *usable data* for the design of V-Belt drives to *perform whatever task may be required.*

Phone for a Gates Field Engineer

Only under exceptional circumstances, of course, will you ever need belts of special construction. But, more often, some drive in your plant may not be operating quite as it should. Or you may have a particularly difficult drive to design. Again, you may want to be sure what size and construction of V-Belts will give the most efficient and the lowest cost service on a certain drive. In any case, you have only to phone a Gates Field Engineer, *always near you* in all industrial centers.

Just look in your phone book under "Gates Rubber." A Gates Field Engineer will come right to your plant and put at your service the full benefits of Gates V-Belt knowledge and experience *without the slightest obligation!*

ENG-518

Gates
Hose V-Belts
Molded Rubber Goods
for Industry

VULCO ROPE DRIVES
ENGINEERING OFFICES AND JOBBER STOCKS
IN ALL INDUSTRIAL CENTERS

THE GATES RUBBER COMPANY
The World's Largest Makers of V-Belts
DENVER, U. S. A.

January 18, 1907 OIL INVESTOR'S JOURNAL

BEAUMONT IRON WORKS, INC.

BEAUMONT, TEXAS

Manufacturers of Complete Rotary Drilling Rigs. Standard Rig Irons, Oil Well Machinery, Oil Well and Pipe Line Supplies.

We carry Boilers, Engines and Pumps in Stock both New and Second-Hand

PRODUCING IN 1907

. . . . PRODUCING IN 1951

BIW Rotary Drilling & Production Equipment *for fast, low-cost operation*

Today—enriched by nearly a half century of experience—BIW continues to produce a wide variety of equipment including drawworks, crown and traveling blocks, wellhead assemblies, coring reels and other equipment of high quality design and fabrication.

A specialty product is the Atlas-Hughes non-lubricated valve for Christmas tree and other oilfield uses. For information on all BIW drilling and production equipment, get in touch with your nearest Atlas Engineering Works representative.

exclusive sales agents

ATLAS ENGINEERING WORKS

Houston and Beaumont, Texas

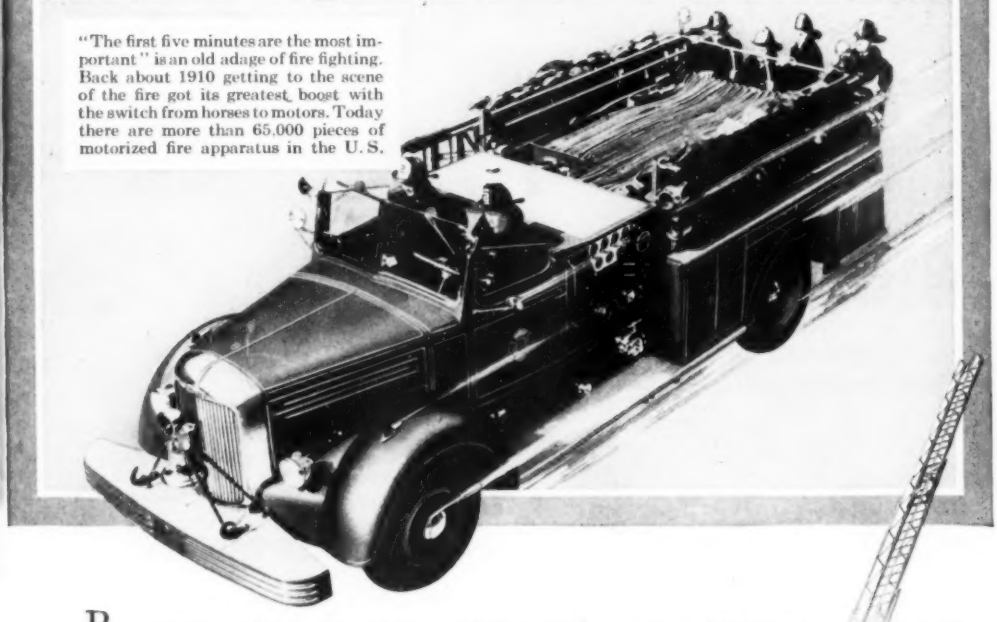
BEAUMONT IRON WORKS COMPANY

a division, American Locomotive Company

The Horses are under the Hood!

Petroleum Progress Helps Curb Huge Fire Losses

"The first five minutes are the most important" is an old adage of fire fighting. Back about 1910 getting to the scene of the fire got its greatest boost with the switch from horses to motors. Today there are more than 65,000 pieces of motorized fire apparatus in the U. S.



PETROLEUM research stepped up the pace and efficiency of America's fire fighters—with the changeover to highly mechanized apparatus and equipment. Today the most remote townships have manpower, motor power, ready and waiting. Texaco lubricants and fuels supply many of the 15,000 U. S. fire departments. Here is another instance of the development, the research and the resources of petroleum, put to good use—in this case to save lives and conserve property.

The word FIRE can turn out more than a million men — organized, trained and equipped to fight fire. 750,000 of these are volunteers— the backbone of our vital fire-control system. We can be proud of them — and proud, too, of the part petroleum plays in supplying them modern fire "weapons".

TEXACO

THE TEXAS COMPANY

Petroleum Promotes Progress

if you need to control

FLOW

TEMPERATURE

PRESSURE

LIQUID LEVEL

of

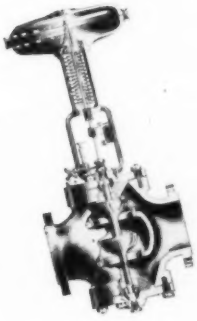
AIR

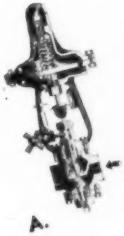
GAS

VAPOR

LIQUID

STEAM





A.

B.

C.

you NEED BS&B "Climax" DIAPHRAGM CONTROL VALVES, Type 86. Here is design and engineering that delivers all the characteristics essential to best process control results. High-lift and characterized inner valves obtain wide rangeability and constant proportional flow increase as valve opens.

Complete versatility is yours. Type 86 Valves are available with reversed topworks (A), duplex diaphragm (B), handwheels (C), finned cooling section, purged gland section, bellows stem packing, steam-jacketed valve bodies and valve positioners. Inner valves are quick-opening, parabolic, V-port, needle and metering pin.

Sizes in double port style ½ inch to 16 inches; single port ½ inch to 4 inches. Pressure ranges are 125 to 5000 psi, within body limits.

Get the complete, detailed story today. Write for new illustrated literature with all the facts on these high-performance Diaphragm Control Valves.

BLACK, SIVALLS & BRYSON, INC.
Adv. Dept., Rm. 51A 7502 East 12th St.
Kansas City 3, Missouri

2

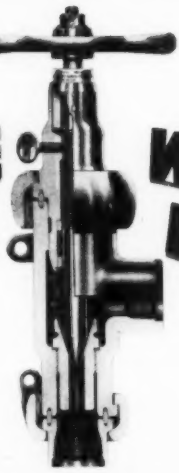
BS&B

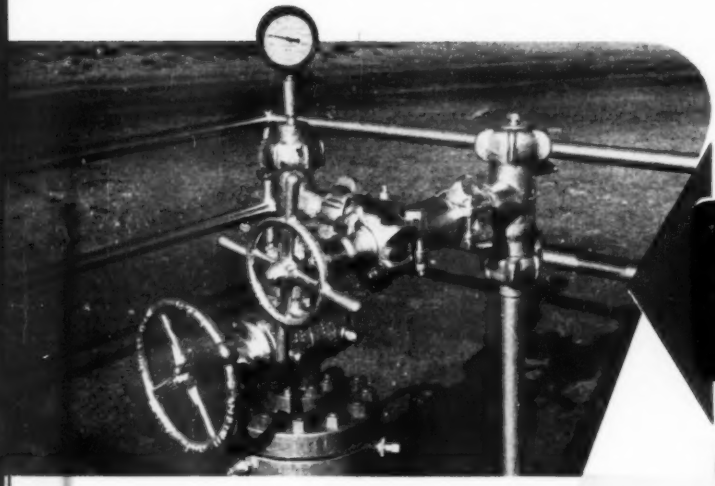
"Climax"

CONTROLS

ON HIGH PRESSURES OR LOW, PRODUCTION FROM ANY WELL CAN BE BETTER CONTROLLED WITH

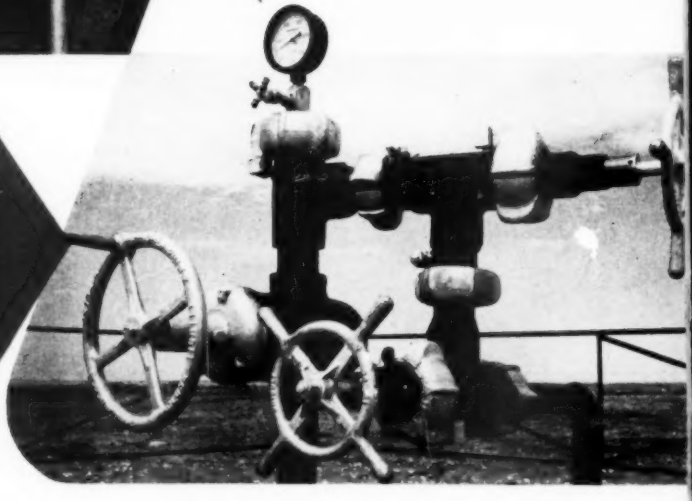
The new UNIBOLT ADJUSTABLE WING VALVE





On high pressure wells, IT'S A DEPENDABLE, LOW COST WING VALVE

On low pressure wells, IT'S A PRECISE, TROUBLE-FREE, ADJUSTABLE CHOKE



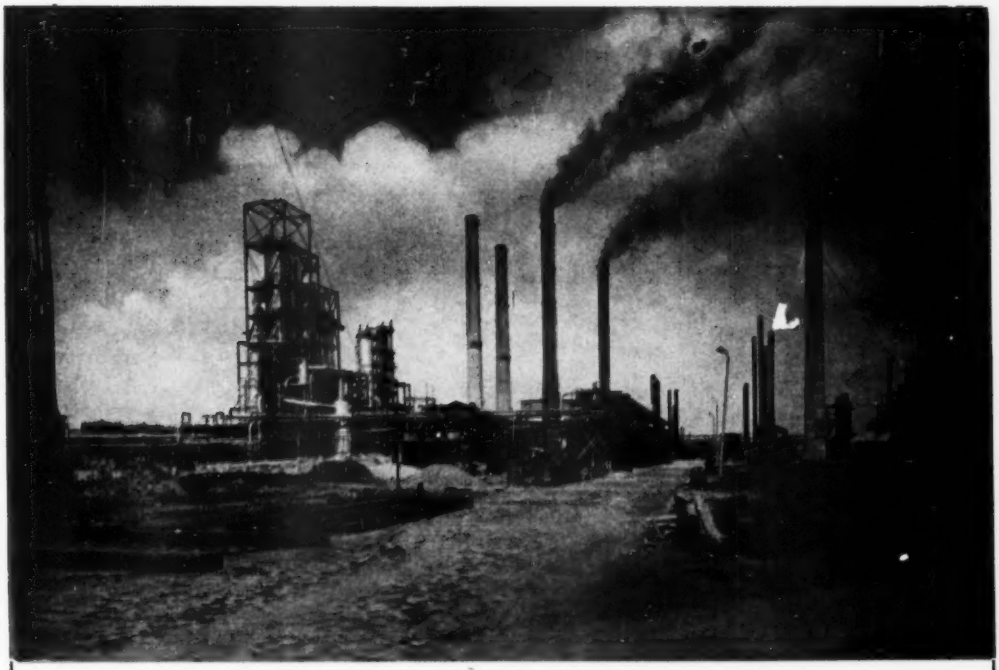
The UNIBOLT Wing Valve, designed originally for use as an adjustable choke where well conditions did not demand a positive choke, has become popular with production men as a dependable valve for numerous services where a positive shut-off is essential. Christmas trees for both producing and injection wells, high pressure oil and gas separator manifolds, heater manifolds, meter runs and similar services are made to order for this dependable, yet relatively low-cost, valve. Since high pressure wells are usually produced through a small positive choke, the one-inch opening provided in the UNIBOLT Wing Valve when in full open position is ample to assure unrestricted flow. An additional advantage is the replaceable stem and seat, which may be changed in the field, easily and at low cost. A recent refinement in its mechanical design is the stem packing which, after the valve is assembled at the factory, never requires adjustment or tightening.

Having standard UNIBOLT Couplings between its component parts, the UNIBOLT Wing Valve is easily dismantled or assembled, and may be readily converted to a Positive Choke Body by substituting a blanking plug and positive bean for the stem and seat assembly.

Available in 6,000, 10,000 and 15,000 lbs. test, and in corrosion resistant alloy.

THORNHILL-CRAVER COMPANY

HOUSTON UNIBOLT TEXAS



They had a problem... When World-War-Number-Two laid waste many of the largest Oil Refineries in Europe, it also left the world pitiably short of new or replacement plant. In fact Global disruption was complete. Oil Companies were hard put to know where to turn for supplies of more and yet more refining plant. Their normal sources of supply — although working at fever pitch, were still saturated with orders that would take years to complete. But the need for plant was urgent. The Royal Dutch Shell Group solved their problem, in part, when they turned to Harveys. For Harveys have one of the most modern and fully equipped works in the world for the fabrication of all kinds of heavy and light plant for the Oil and many other Industries. *In fact Yours the problem – Harveys the answer!*

FABRICATORS **Harvey** **IN METAL**

G.A. Harvey & Co. (London) Ltd. Woolwich Road, London, S.E.7

WHAT COULD BE EASIER?

. . . than taking candy from a baby or installing a casing hanger from the derrick floor!

O-C-T "C-19" CASING HEADS HAVE SET A NEW *SAFETY STANDARD* for RIGS AND CREWS

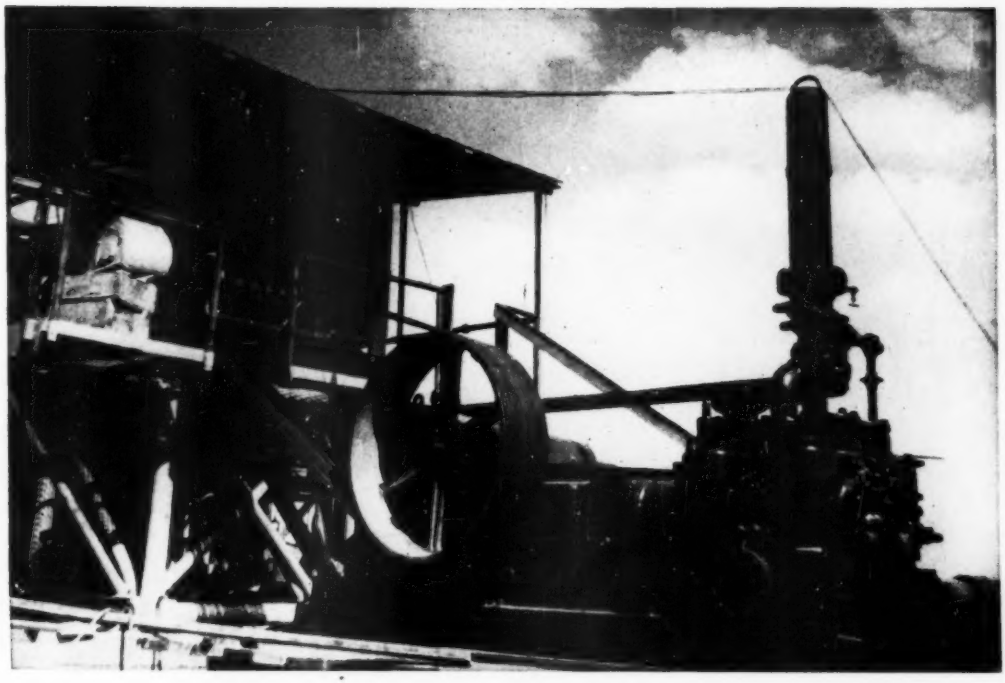
When it arrives at your rig, the O-C-T "C-19" Casing Hanger has been pre-assembled and is ready to install from the derrick floor. So, instead of seven separate pieces to "juggle" and install when hanging pipe, the sealing element, slip bowl and slips in the "C-19" are assembled as a single unit that may be quickly wrapped around the casing, latched and dropped into place in a jiffy. The seal is automatic when casing weight is applied; thus, elevators are released to raise blowout preventers. Now, what could be easier? All the work is done from the derrick floor without leaving any remote possibility open at any time for your well to pressure up and blow out. Ask your O-C-T Representative or write for details on the "C-19" . . . the first slip type casing head to meet every well completion condition with a single compact model!

Oil Center Tool Co.

P. O. Box 3091, Houston, Texas

Canada — Canadian-Vickers, Montreal, Canada

Sterling Areas — Le Grand, Sutcliff & Gell, Ltd., Southall, Middlesex, England. Address Export Inquiries for All Other Countries to P. O. Box 3091, Houston 1, Texas.



This is the Drive the Production Men Wanted ... They Got It ... Now Everybody Prefers It

It was the demand of the oil production men for a sheave like this that gave the QD sheave its start.

Now it's the most widely used hub-and-rim combination . . . in *all* industries.

Why does the Worthington QD satisfy the man in the oil fields?

Because it's *stronger*. Each size is designed for the load it has to carry—rather than proportioned for various sizes from one standard design.

Because it's *easier*. Easy to *get on*—split hub is clamped to shaft, heavier taper-bored rim slides easily over tapered hub. Easy to *get off*—long pull-up bolts are used as jack screws to remove the rim; hub stays put, no realignment problem.

Because it's always *tight* on the shaft. The friction cone grip of rim on hub makes a positive press fit on the shaft.

And because it's quickly *available*. Local distributor stocks all over the Southwest and other oil field areas, are backed by factory stocks in Los Angeles, Fort Worth, Houston, Tulsa, and New Orleans.

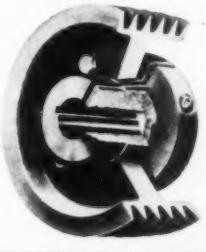
Standardize on Worthington Multi-V-Drive, with the original tapered cone grip sheave. Worthington Pump and Machinery Corp., Multi-V-Drive Sales Division, Buffalo, N. Y.

MV.1.10

QD

*Trade Mark

Most widely used hub-and-rim sheave



WORTHINGTON

THE GOOD RIGHT HAND OF INDUSTRY

POWER TRANSMISSION: sheaves, V-belts, variable speed drives

PUMPS: centrifugal, power rotary, steam

AIR COMPRESSORS: water-cooled, air-cooled

Three kinds of towers

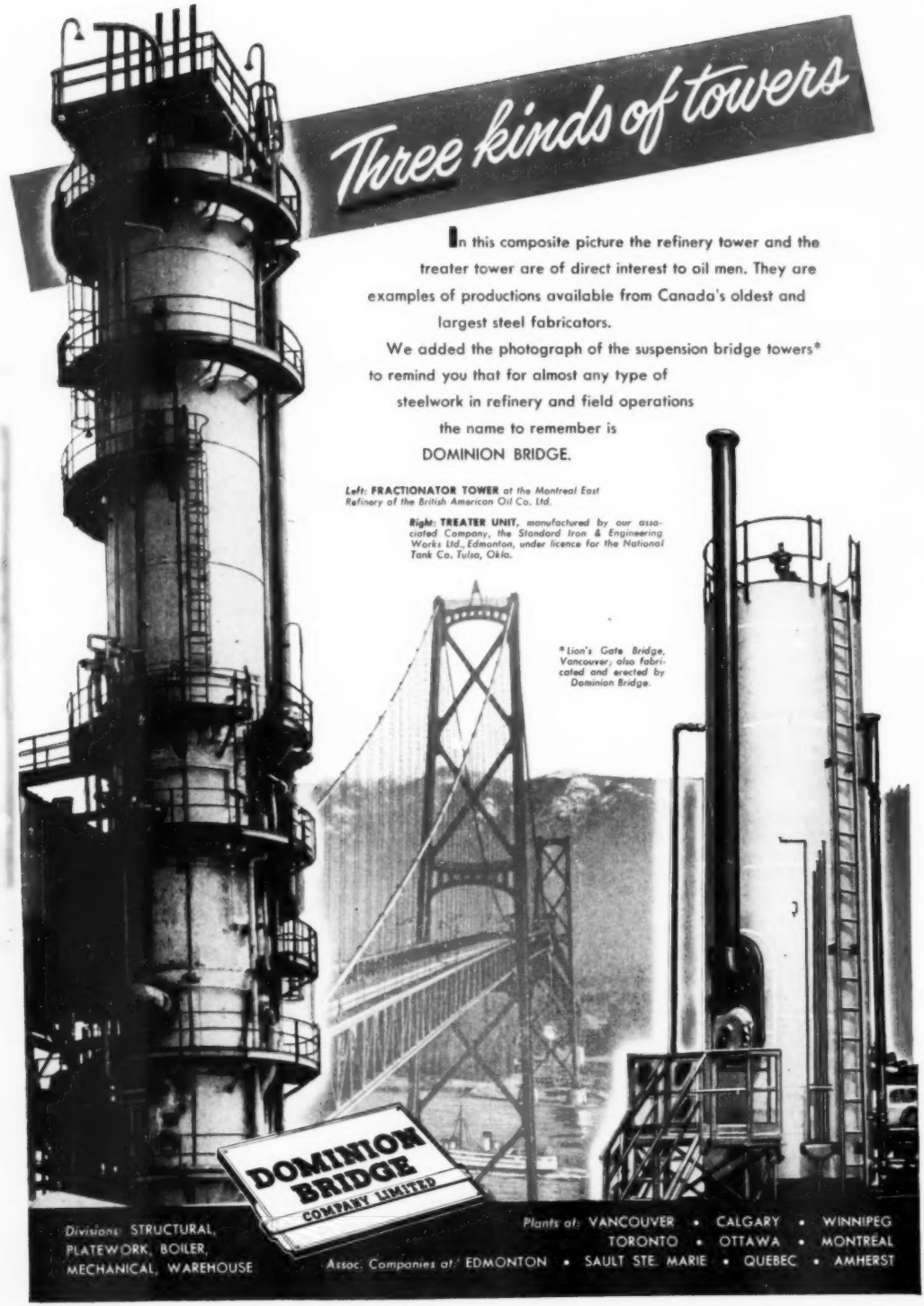
In this composite picture the refinery tower and the treater tower are of direct interest to oil men. They are examples of productions available from Canada's oldest and largest steel fabricators.

We added the photograph of the suspension bridge towers* to remind you that for almost any type of steelwork in refinery and field operations the name to remember is DOMINION BRIDGE.

Left: **FRACTIONATOR TOWER** *at the Montreal East Refinery of the British American Oil Co. Ltd.*

Right: **TREATER UNIT,** *manufactured by our associated Company, the Standard Iron & Engineering Works Ltd., Edmonton, under licence for the National Tank Co. Tulsa, Okla.*

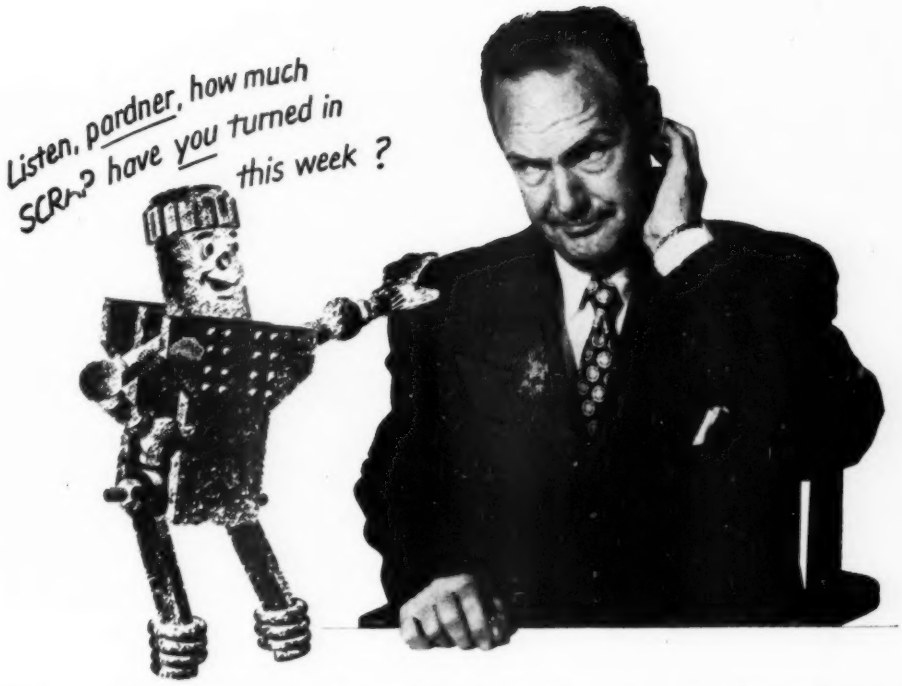
**Lion's Gate Bridge, Vancouver; also fabricated and erected by Dominion Bridge.*



Divisions: STRUCTURAL, PLATEWORK, BOILER, MECHANICAL, WAREHOUSE

Plants at: VANCOUVER • CALGARY • WINNIPEG TORONTO • OTTAWA • MONTREAL

Assoc. Companies at: EDMONTON • SAULT STE. MARIE • QUEBEC • AMHERST



Today, the steel business is your business

—*it needs all your SCRAP, Now!*

SUPPOSE that every steel user were suddenly told that he had to turn in a half-ton of scrap before he could get a ton of steel. It would start the most gosh-almighty treasure hunt for scrap that ever happened.

In effect, this "no-scrap, no-steel" situation virtually exists. For without *all* the scrap that industry can search out and start on its way to the mills, steel production will surely drop. It's as serious as that.

More scrap is urgently needed. Today the mills are turning out more steel than ever before. But they're scraping the bottom of the barrel as far as scrap is concerned. Defense and domestic demands for steel simply cannot be met unless at least 100,000 tons of "purchased" scrap roll into the furnaces—*every day.*

The bulk of this scrap must come from industry. That's why we're asking for your all-out help. That's why it's so important that you make the drive for scrap part of your daily operations. Make it your business to encourage every employee to report any obsolete, broken or worn-out machinery, tool or equipment that has seen its day. From this dormant "junk" must come the heavy melting scrap that the mills need most. Don't let your scrap lie idle; send it on its way. How about it, pardner?

You'll find your local scrap dealers listed in the yellow pages of the phone directory.

This page would ordinarily be used to tell you about

U·S·S CARILLOY STEELS

but, because without SCRAP we cannot produce steel, we are asking instead for your all-out help in getting more SCRAP to the mills.

UNITED STATES STEEL COMPANY, PITTSBURGH · COLUMBIA STEEL COMPANY, SAN FRANCISCO
TENNESSEE COAL, IRON & RAILROAD COMPANY, BIRMINGHAM
UNITED STATES STEEL SUPPLY COMPANY, WAREHOUSE DISTRIBUTORS, COAST-TO-COAST
UNITED STATES STEEL EXPORT COMPANY, NEW YORK

USS

1-1326

UNITED STATES STEEL

It's Storage

the NAME You for Economy

...BLACK, Bolted

EFFICIENCY

BS&B

RELIABILITY

S14

Insurance...

Can Trust for Quality, and for Service!

SIVALLS & BRYSON

Steel Tanks

There is real *protection* for you in BS&B's 58 years of tank experience. BS&B has developed precision fabrication and accurate quality control throughout production. BS&B branches, close-by wherever oil is found, provide speedy reliable erection service.

BS&B Bolted Tank capacity is easily increased or decreased at the site. They are adaptable to your exact needs. They are easily transported . . . many have been shipped via pack horse or by plane into undeveloped areas.

And the *tightness* of BS&B Bolted Tanks can boost your profits! You can easily hold the light ends of your crude by using these tried and proved tanks.

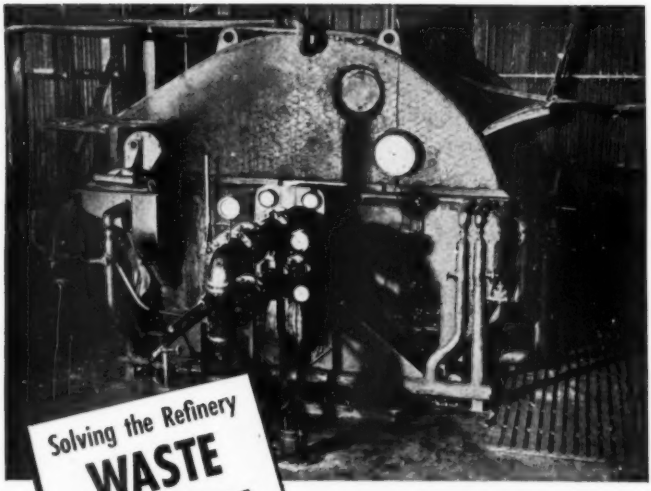
Compare the speed and ease of erection . . . the modest first cost . . . the long, trouble-free service life . . . the versatility . . . the unique widespread service organization. Yes . . . *compare* and you will find the leader is BS&B . . . Tank Supplier to the Industry for nearly six decades!

Call your BS&B Man today . . . or write for latest information.

BLACK, SIVALLS & BRYSON, INC.

OIL AND GAS EQUIPMENT DIVISION, RM. 14A

2131 Westwood Blvd. Oklahoma City, Okla.



Solving the Refinery
WASTE DISPOSAL PROBLEM
. . . automatically, economically!

OLIVER PRECOAT FILTER

Trap residues—separator box emulsions—sludges . . . the Oliver Precoat Filter can effectively handle these wastes by dewatering sludges and breaking oil-water emulsions, resulting in stocks for refinery re-run and water ready for disposal in public streams. For example, a refinery is obtaining an oil phase carrying only 2/10 of 1% sludge and only a trace of water; the water phase is comparatively oil-free.

Oliver United engineers, calling on their 42 years of filtration experience and their many varieties of filter types, developed this closed type, continuous vacuum precoat filter for handling refinery wastes. It's proving a boon to refineries in connection with this vexing problem.

A letter or phone call to our nearest office will have a skilled refinery filtration engineer at your plant whenever desired to make a study and recommendations for a filtration plant to handle the wastes properly.

• • •

Another very profitable use of the Oliver Precoat Filter in refineries is in connection with contact clay handling. Many are in service providing continuous handling, great reduction in oil losses over other methods, and more easily handled cake.

OLIVER UNITED FILTERS INC.

New York—33 West 42nd Street
Chicago—221 N. La Salle Street
Oakland—2900 Glascock Street
San Francisco—260 Calif. Street
Factories: Hazleton, Pa. • Oakland, Calif.
Export Sales Office—New York

Cable—OLIUNIFILT

They Say—

Transition Quarter

Sir:

I am sure that you and other people interested in national affairs and public opinion are noting with interest the confusion which we predicted for the transition quarter (third quarter 1951) in converting from the priority system to the controlled-materials plan. It is our hope that we can keep this period of confusion in transition to the third quarter. The transition quarter in 1943 was equally troublesome, or maybe more troublesome, and undoubtedly you remember that in that period the controlled-materials plan was referred to as "confusion made permanent."

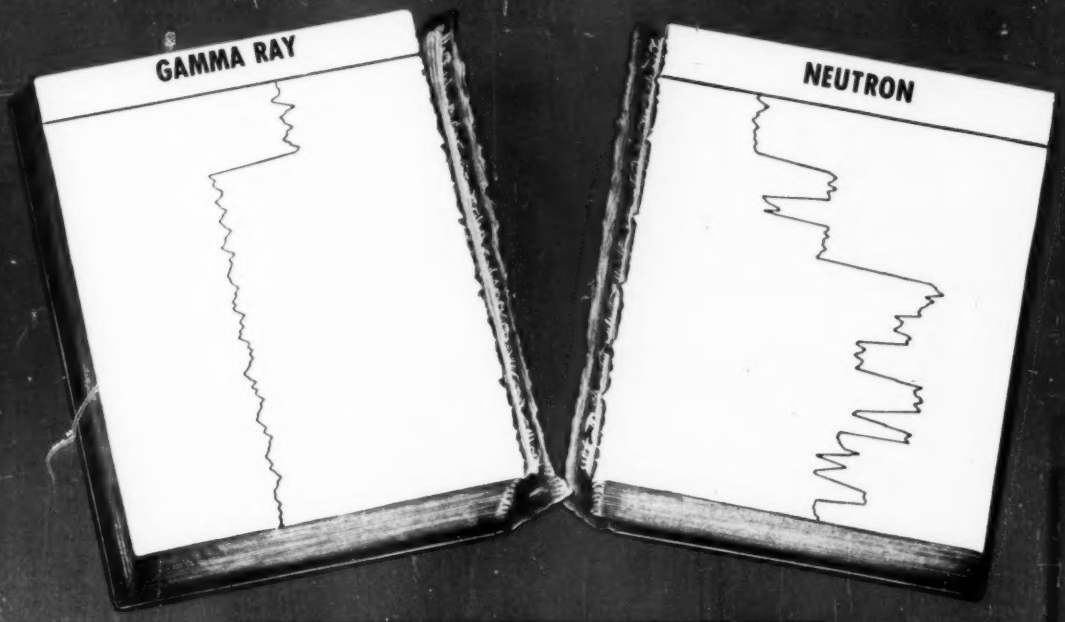
It is hoped that during this difficult period the business editors of the country will continue to assist in providing a thoughtful, stabilizing influence over the emotion created by the difficulties of this transition period, thereby helping to get over the transition period and gain the confidence of people in industry and government who must achieve an orderly system of production and construction control to meet the required objectives. As you might well believe, we are working vigorously and are getti g a lot of assistance from the press and from business editors in thoughtful analyses of our problems, as well as coverage with respect to the actions we are taking and which industry must take to bring about an orderly operation by the end of this transition period.

Walter C. Skuce,
Assistant administrator for production controls, National Production Authority, Washington.

It Could Be Dangerous

"The Coastal states had undisputed ownership of their submerged lands for over 100 years, backed up by no less than 52 decisions of the Supreme Court. In 1936, former Secretary of the Interior Harold Ickes laid claim in the name of the federal Government to the submerged oil-bearing lands off the California coast in order to transfer to the federal Government the revenues from this oil production. His claims were finally upheld by the California 'tidelands' decision of the Supreme Court in 1947, not on the basis of federal ownership, but on the premise that state ownership might encumber national defense and, therefore, the federal Government had 'paramount rights' and 'national dominion.'

"The National Chamber sees no



It takes BOTH curves to get the full story

The Gamma Ray does a great job in charting the formations pierced by the well, there's no denying that. But the Gamma Ray curve is something like the first half of a book — it doesn't tell the whole story. For that, for the last chapters of the book, you need the Neutron curve.

Since the Neutron instrument responds to formation fluids, it supplements and completes the story started by the Gamma Ray (which does *not* show fluid content). As an example, take the not unusual case of a productive sand or limestone formation with impermeable streaks which, in effect, form separate reservoirs. The Gamma Ray curve defines the extent of the whole body, but it takes the Neutron curve to show the location and extent of the impermeable streaks and thus indicate the best possible completion program. The Neutron curve also makes unmistakably clear the difference between certain formations which sometimes record similarly on the Gamma Ray curve.

As if this were not enough, the Neutron curve supplies still further information. Being sensitive both to fluid and to the shielding effects of casing, the Neutron curve is of great value in establishing, accurately, the location of casing seats, liner overlaps and the well's fluid level. So, on your next well logging job, give thought to getting *both* curves — having the complete story pays.

Tomorrow's Tools - Today!

LANE WELLS

Radioactivity
WELL LOGGING

Meet Your
"No. 1" FREIGHT INFORMATION MAN

Your Santa Fe Freight Representative knows the answers to your problems

Your Santa Fe freight representative is a professional "answer man," with ready access to the collective information, knowledge and "know-how" of Santa Fe's entire organization of transportation specialists.

He is either in your town, or has your town assigned to him. Either way, he is no further away than your telephone.

Call on him freely for expert advice on your shipping problems. Find out why *it pays to ship Santa Fe all the way.*

F. H. Rockwell, *General Freight Traffic Mgr.*
Santa Fe System Lines, Chicago 4, Illinois

Santa Fe—*all the way*

Santa Fe

danger to either our defense effort or the conservation of our natural resources in state ownership and operation of these submerged lands. It does believe that the Supreme Court's doctrine of federal 'paramount rights' because of national defense is a dangerous one that some day might be applied by the federal Government to inland property or natural resources, in spite of present disclaimers by officials."

Natural Resources Notes, United States Chamber of Commerce.

No Greater Availability

"Loudly the opponents of state ownership of the tidelands trumpet that these lands should be in the hands of the federal Government because the oil they contain must be available to the nation in case of war. Assuredly this oil must be available for national emergency, just as every other thing in the nation of value in prosecuting war must be, but it does not follow that this necessitates federal ownership and control of the offshore lands. What this argument ignores is the fact that the tidelands oil would be just as available to meet the demands of war—and perhaps more so—under state ownership as under national ownership."

Editorial in the Fort Worth Star-Telegram.

CALENDAR

September

Billings Geological Society, second annual field conference, Billings, Mont., September 7-9.

International Union of Pure and Applied Chemistry, sixteenth conference, Hotel Statler, New York City, September 8-9.

First National Petroleum Convention, Liceo Andres Bello, Caracas, Venezuela, September 9-18.

New York Oil Heating Association, Inc., Hotel Statler, New York City, September 10.

Interstate Oil Compact Commission, summer meeting, Fort Worth, September 10-11.

International Congress of Pure and Applied Chemistry, twelfth conference, Hotel Statler, New York City, September 10-13.

Instrument Society of America, Coliseum, Houston, September 10-14.

American Society of Mechanical Engineers, Industrial Instrument and Regulators division, Coliseum, Houston, September 10-14.

National Petroleum Association, Hotel Traymore, Atlantic City, September 12-14.

Air Pollution and Smoke Prevention Association of America, east-central section meeting, Detroit, September 13-14.

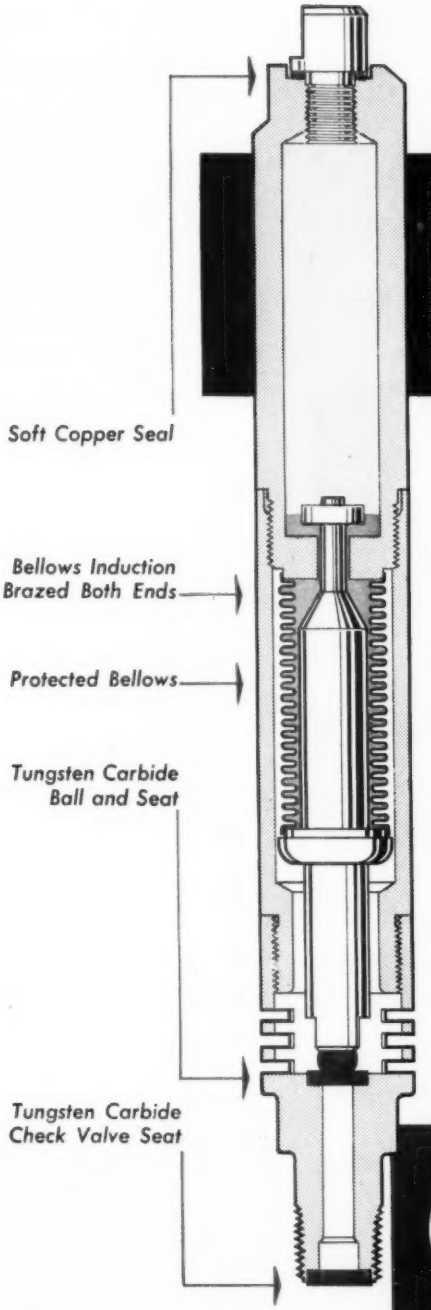
International Union of Pure and Applied Chemistry, sixteenth conference, Hotel Statler, Washington, D. C., September 14-15.

American Institute of Chemical Engineers, national meeting, Sheraton Hotel, Rochester, N. Y., September 17-19.

Western Petroleum Refiners Association, regional meeting, Hotel Henning, Casper, Wyo., September 20-21.

Independent Natural Gas Association of America, annual membership meeting, Skirvin Hotel, Oklahoma City, September 24.

American Association of Oilwell Drilling Contractors, eleventh annual meeting, Texas Hotel, Fort Worth, September 24-25.


Soft Copper Seal
Bellows Induction Brazed Both Ends
Protected Bellows
Tungsten Carbide Ball and Seat
Tungsten Carbide Check Valve Seat

INCREASED LIFE FOR FLOW VALVES

Guiberson is *first* to solve the problem of using tungsten carbide for both the ball and seat of its pressure valve, thus insuring longer life.

Intermitting or Continuous Flow with Same Valve now **PROVEN!**

Save Cost in Initial Installation . . . Save Cost in Operation with Guiberson Gas Lift Equipment

TYPE "A"

GUIBERSON

Guiberson Gas Lift Equipment is protected by the following patents.

2,158,429	2,227,132	2,271,859	2,340,028	2,361,718
2,188,656	2,230,107	2,292,768	2,347,620	2,377,981
2,188,668	2,236,137	2,305,250	2,358,944	2,411,315

Other patents pending.

CUT CORROSION PROBLEMS DOWN TO SIZE...

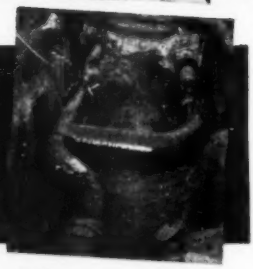
WITH TAPECOAT*

—the Coal Tar Coating in Handy Tape Form

—Sized to the job

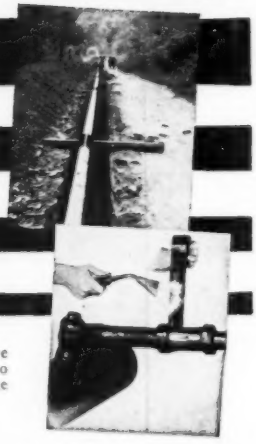
24" WIDTH

TAPECOAT — the economical coal tar coating for "cigarette-wrapping" mechanical couplings, large diameter pipe, joints, bends and drips.



18" WIDTH

TAPECOAT—the practical coal tar protection for "cigarette-wrapping" of large couplings, pipe bends, and joints on large diameter pipe.



6, 4, 3, and 2" WIDTHS

TAPECOAT — the distinctive, time-tested coal tar tape for spiral-wrapping welded field joints, service connections, pipe under streets and sidewalks, and pipe through building walls.

For more than 10 years, Tapecoat engineers have specialized in pipe joint protection. Call on them to help you meet your individual requirements. Write today for complete details.

The TAPECOAT Company

Originators of the Coal Tar Tape for Pipe Joint Protection

1539 LYONS STREET • EVANSTON, ILLINOIS

*Reg. U.S. Pat. Off.

American Society of Mechanical Engineers, sixth petroleum mechanical-engineering conference, Mayo Hotel, Tulsa, September 24-26.

American Society of Mechanical Engineers, fall meeting, Radisson Hotel, Minneapolis, September 25-28.

Texas Independent Producers and Royalty Owners Association, midyear directors' meeting, Tyler, September 28.

October

American Institute of Mining and Metallurgical Engineers, petroleum branch, fall meeting, Oklahoma City, October 3-5.

California Natural Gasoline Association, twenty-sixth annual fall meeting, Ambassador Hotel, Los Angeles, October 4-5.

Texas Mid-Continent Oil and Gas Association, annual meeting, Hotel Beaumont, Beaumont, Tex., October 8-9.

American Oil Chemists' Society, fall meeting, Edgewater Beach Hotel, Chicago, October 8-10.

National Safety Council, thirty-ninth national safety congress and exposition, Stevens Hotel, Chicago, October 8-12.

Indiana Independent Petroleum Association, fall convention, Hotel Severin, Indianapolis, October 13-14.

Oil Progress Week, October 14-20.

National Association of Corrosion Engineers, Permian Basin Corrosion Tour, Odessa, Tex., October 15-16.

American Petroleum Credit Association, twenty-seventh annual conference, Adolphus Hotel, Dallas, October 15-17.

American Gas Association, annual convention, Kiel Auditorium, St. Louis, October 15-17.

National Metal Congress and Exposition, American Society for Metals, American Welding Society, American Institute of Mining and Metallurgical Engineers, and Society for Non-Destructive Testing, Hotels Statler, Book-Cadillac, and Detroit-Leland, Detroit, October 15-19.

Institute of Gas Technology, annual meeting, Chicago, October 18.

American Chemical Society and Southern Association of Science and Industry, Southwide Chemical Conference, Wilson Dam, Ala., October 18-20.

National Association of Corrosion Engineers, South Central Region, annual meeting, Corpus Christi, Tex., October 18-20.

American Association of Petroleum Geologists, regional meeting, Commodore Perry Hotel, Austin, Tex., October 18-20.

Natural Gasoline Association of America, southern regional meeting, Blackstone Hotel, Tyler, Tex., October 19.

Independent Petroleum Association of America, Shamrock Hotel, Houston, October 21-23.

American Institute of Electrical Engineers, fall general meeting, Hotel Cleveland, Cleveland, October 22-26.

Society of Exploration Geophysicists, eastern regional meeting, Webster Hall Hotel, Pittsburgh, October 25.

American Institute of Mining and Metallurgical Engineers, petroleum branch, annual meeting of West Coast chapter, Elks Club, Los Angeles, October 25-26.

Society of Automotive Engineers, diesel-engine division, Drake Hotel, Chicago, October 29-30.

Society of Automotive Engineers, fuels and lubricants division, Drake Hotel, Chicago, October 31-November 1.

November

Louisiana-Arkansas Division, Mid-Continent Oil and Gas Association, twenty-ninth annual meeting, Roosevelt Hotel, New Orleans, November 1-2.

American Association of Petroleum Geologists, Pacific section annual fall meeting, Ambassador Hotel, Los Angeles, November 1-2.

American Petroleum Institute, thirty-first annual meeting, Stevens Hotel and Palmer House, Chicago, November 5-8.

Southwest Research Institute, second conference on coastal engineering, Rice Hotel, Houston, November 7-10.

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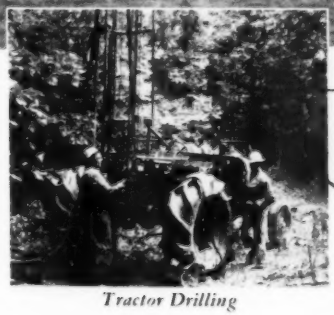

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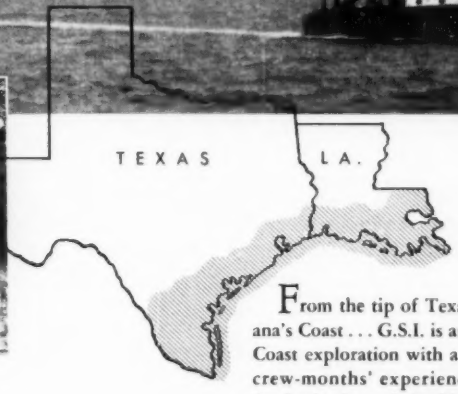

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cieties, first annual meeting, Roosevelt Hotel, New Orleans, November 15-17.

Rocky Mountain Oil and Gas Association, annual meeting, Cosmopolitan Hotel, Denver, November 15-17.

Society of Exploration Geophysicists, regional meeting, Baker Hotel, Dallas, November 19-20.

American Society of Mechanical Engineers, annual meeting, Chalfonte-Haddon Hall, Atlantic City, November 25-30.

Twenty-third Exposition of Chemical Industries, Grand Central Palace, New York City, November 26-December 1.

December

American Institute of Chemical Engineers, annual meeting, Chalfonte-Haddon Hall, Atlantic City, December 2-5.

Chemical Specialties Manufacturers Association, thirty-eighth annual meeting, Mayflower Hotel, Washington, D. C., December 3-4.

Natural Gasoline Association of America, Panhandle-Plains regional meeting, Herring Hotel, Amarillo, Tex., December 7.

New York Oil Heating Association, Inc., Hotel Statler, New York City, December 10.

American Association for the Advancement of Science, annual meeting, Philadelphia, December 27-28.

1952 MEETINGS

Society of Automotive Engineers, annual meeting, Hotel Book-Cadillac, Detroit, January 14-18.

American Society for Testing Materials, spring meeting, Hotel Statler, Cleveland, March 3-7.

National Association of Corrosion Engineers, eighth annual conference and exhibition, Galvez Hotel, Galveston, Tex., March 10-14.

American Institute of Chemical Engineers, regional meeting, Atlanta, March 16-19.

American Petroleum Institute, Division of Production, Mid-Continent district meeting, Broadview Hotel, Wichita, Kans., March 19-21.

Southwestern Gas Measurement Short Course, University of Oklahoma, Norman, April 8-10.

Southern Gas Association, annual convention, Galveston, Tex., April 28-30.

American Institute of Chemical Engineers, regional meeting, French Lick, Ind., May 11-14.

American Gas Association, Natural Gas Department spring meeting, Biltmore Hotel, Los Angeles, May 12-13.

American Petroleum Institute, Division of Refining, seventeenth midyear meeting, San Francisco, May 12-15.

American Gas Association, production and chemical conference, Hotel New Yorker, New York, May 26-28.

Canadian Gas Association, Chateau Frontenac, Quebec, June 8-12.

American Society for Testing Materials, annual meeting, Hotel Statler, New York, June 23-27.

NOMADS

Tulsa Nomads, third Friday of each month. After Five Room, Tulsa Hotel.

Dallas - Fort Worth Nomads, first Monday of each month, Greater Dallas Club.

Houston Nomads, second Monday of each month, Ye Olde College Inn, Houston.

Los Angeles Nomads, second Wednesday of each month, Jonathan Club.

New York Nomads: September 11, luncheon, Downtown Athletic Club; September 18, golf party, Knoll Golf Club, Boonton, N. J.; October 1 and October 29, regular meetings, Louis Sherry's; December 8, Christmas dinner dance, Hotel Pierre.

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JOURNALLY Speaking

Left-Hand Drawer

THE biggest thing in West Texas oil these days is the play in Spraberry, where the sands are tight and the surveys are loose. Much of that country was given to the railroads as inducement to build lines and a lot more was sold for 50 cents a section. At that price, and probably with Indian raids and buffalo stampedes kibitzing their work, the early-day surveyors weren't always quite as precise as modern standards of that profession dictate.

The result is that in some places ownership lines are a bit confused, to say the least, and oil companies and royalty owners are spending a lot of money in lawsuits and resurveys to find out just who owns what. Some rare stories are cropping up about the old surveys, but the one we like best is about the surveyor who was a better artist than scientist.

This old boy kept a lot of notes, but his corner posts didn't show up where they ought to be, and the oil company's resurveyor was stumped. The old notebook was full of little sketches, including some of the surveyor's camps. One of these showed a cartridge belt, holster, and Colt .45 hanging on the tent pole.

Here, reasoned the resurveyor, was a clue. If that fellow wore his six-gun on the job, the metal in it would deflect his compass just a little. So he ran another line along what he figured would be the proper deviation for a shooting iron, but still couldn't find the corner. But further study of the notebook convinced him that the guy was left-handed, so probably packed his rod on the left hip. So he ran another line with a leftward compass deviation and there, sure enough, was the original corner marker, right where the old artist said he located it.

Boy, you sure run into everything in this oil business.

The Well-Dressed Texan

CARL HOOT, our Dallas editor, writes that they had a slight warm spell in Texas recently. He couldn't tell just how hot it got because his thermometer, evidently manufactured in the Far North, wouldn't register above 117°.

Everybody in Dallas talked about the weather, he says, but only a few did anything about it. These few, including Carl, took the drastic step of being seen in public without coats.

But one day Carl put on his coat and called on a big-shot oil man. The oil man (he shall remain mercifully anonymous) was working without his coat, but he hastily put it on as our Mr. Hoot was ushered in.

"I asked him why he wore his coat in the office," Carl wrote, "and he said it was because he wanted to look like a gentleman when he had callers. So there I was all bundled up in coat and tie to call on him because he is bundled up in coat and tie for me to call on him, and you can see that this goes on and on. I'm trying to impress him that I am a gent because he is trying to impress me that he is a gent, and there's no end to this thing. Won't somebody start a crusade against this coat-and-tie foolishness?"

We would hesitate to try to reform a Texan, particularly a Dallasite, and besides it's a bit too late for this year. Carl admits that himself, because in a postscript he noted that Dallas had been hit by what the newspapers called a cold front, the thermometer skidded down to 98°, and the merchants started advertising winter suits—including heavy coats.

Tidelands Sulfur

THE sulfur industry is elated at the discovery of a large new deposit in Garden Island oil field at the mouth of the Mississippi River, but we feel it our duty to warn the sulfur men that they may be in for trouble.

According to our map, that sulfur discovery is mighty close to the line which the federal Government says marks the offshore marginal sea over which it has "paramount rights and dominion." So if the sulfur drillers should edge a little too far out they are liable to find their lease tied up in a Supreme Court suit and their operation denounced by the Interior Department as "rape of the people's sulfur." Ask any tidelands oil operator.

--Henry D. Ralph

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September 6, 1951

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Washington officials apparently assume that the United States is obligated to make up most of the deficit in the world's supply of petroleum caused by the shutdown in Iran. In cooperation with a group of major companies they are developing plans to divert imports of crude and increase exports of products.

The possible impact of these plans on domestic oil operations and supplies is probably not fully understood by the American oil industry. At present this country has heavy stocks of crude and most products, and can stand a considerable added burden for several weeks without serious effects.

But if Iranian oil stays off the world market until midwinter, many oil operators and consumers in this country may be in for a difficult period.

Already approximately 75,000 bbl. per day of foreign crude intended for the United States and Canada has been diverted to European refineries, and the plan calls for stepping this up by another 115,000 bbl. per day by October 1. Oil-producing states have been asked to increase their allowables and some pipe-line projects are being expedited to move crude from fields with unused capacity, but an increase in production of this magnitude cannot be achieved quickly and easily, so crude stocks may decline.

It is in refined products that the greatest pinch may develop. Even with plenty of crude, refineries in the Western Hemisphere cannot increase their runs enough to fill the anticipated deficit in global supplies. In recent weeks our exports of refined products have been increased by 210,000 bbl. per day to help meet Europe's needs. This has not filled the gap, even though refineries in the Caribbean and the Eastern Hemisphere have increased their output by 25,000 bbl. per day.

With the arrival of winter weather domestic demands will increase and it may not be possible to continue the present rate of exports without hurting some consumers. First to feel the pinch will be residual fuel oil, used by industries and shipping. Our stocks of this are low and a tight market was in prospect even before the Iranian crisis.

By the end of the year, unless Iran gets back into full operation, the United States oil industry will be operating at its maximum producing and refining capacity. Stocks of products may be worked down to bare operating levels, particularly on the East Coast. In the interior there should be no shortages, but a severe winter in the East might make it extremely difficult to meet domestic demands and foreign commitments at the same time.

The American oil industry has been glad to carry heavy stocks, even at the risk of some price softening, as insurance against a national emergency. Now it appears that this margin of safety may be wiped out and the industry strained to live up to this nation's assumed role of global supplier.

THIS WEEK

INTERNATIONAL—Britain settles back to await effects of internal pressure on Iranian Government. . . . Both sides claim next move is up to the other. . . . Iran offers to sell crude at 20 per cent discount. . . . ¶Construction of big Kirkuk-Banias line in Iraq moves ahead rapidly; completion expected by April, well ahead of schedule. . . . ¶Tropical Oil returns De Mares concession to Colombian Government and vanishes in favor of new firm, International Petroleum (Colombia). . . . ¶Operators in Peru claim price controls and domestic requirements are forcing them to sell at below-cost prices. . . . ¶Rigs now running in the non-Communist world outside the United States total more than 600. . . .

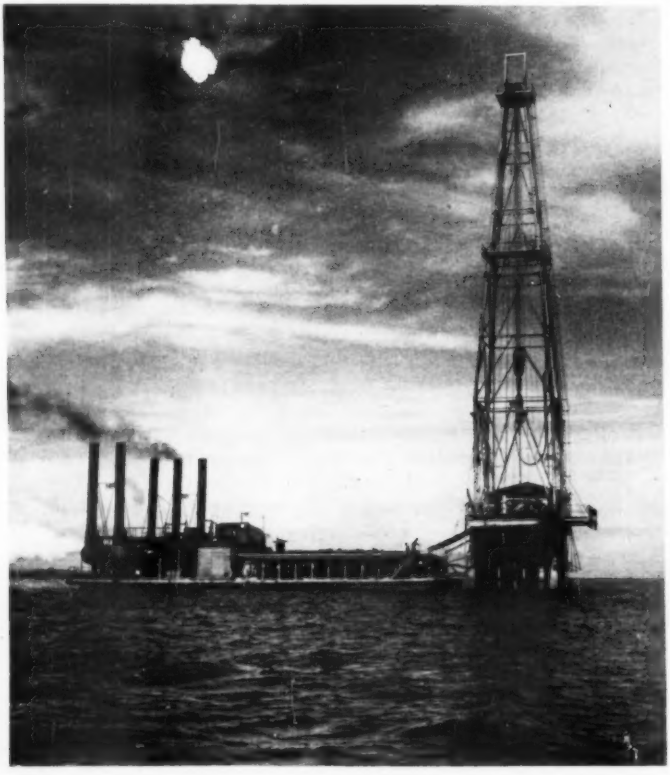
GOVERNMENT—Tariff Commission and State Department take first steps toward renegotiating new and more liberal reciprocal-trade agreement with Venezuela. . . . Hearings set to determine newly required "peril point" and to get views of domestic producers, importers, and exporters. . . . ¶NPA's sharp cutback in September allocation of lead to TEL manufacturers may force drop in octane ratings of civilian gasoline. . . . ¶PAD urges operators to make sure their applications for oil-country tubular goods for the first quarter 1952 are in the mail by midnight September 30. . . . Four hundred caught without allocations in fourth quarter due to late filing. . . . ¶Initial estimates of steel needs for oil and gas industry during 1952 total close to 10,000,000 tons. . . .

ACTIVITY—Crude production for week ended September 1 averaged 6,157,675 bbl. daily, up 6,400 bbl. daily from previous week and 475,750 from same week last year. . . . ¶Total completions set a new record at 993 wells, an increase of 82 over previous week and 161 greater than for same week last year. . . . ¶Wildcat completions totaled 232 compared with 205 a week earlier and 155 in same week of 1950. . . .

TRENDS—Rotary rigs operating in United States in 3-week period ended August 27 averaged 2,709, an increase of 490 rigs or 22 per cent over the same period last year. . . . Average for year to date is 2,371, up 300 rigs or 14.5 per cent from same period in 1951. . . .

TECHNOLOGY—World Chemical Conclave under way with members of American Chemical Society comparing knowledge and theories on how oil originated millions of years ago. . . . Meetings of the International Union of Pure and Applied Chemistry and Twelfth International Congress of Pure and Applied Chemistry round out mammoth, three-decker, confab. . . . ¶Dowell, Radioactive Products develop new method using heavy isotopes of iodine as radioactive tracers in control and evaluation of oil-well acid treatments. . . . Tests so far performed on Kansas City-Lansing and Arbuckle limestones in western Kansas and dolomitic formations in the Seminole area of Oklahoma. . . .

PRODUCTION—Second Pettit lime-reservoir water flood proves successful in North Louisiana as Southwest Lisbon injection project within a year increases production to more than twice what it would have been under normal depletion. . . . ¶Possible return by Congress of Wilmington tidelands in California stimulates ideas for solving unique production problems of rich field. . . . Big islands, little islands, breakwater sites, and mining methods proposed. . . .



SPEEDY OPERATION.—Rigs like this one in Lake Maracaibo are sinking field development wells in as little as 7 days as Creole Petroleum Corp. steps up its effort to increase Venezuelan production. While the number of rigs in use by the company has remained relatively constant, many more wells are now being drilled than formerly as a result of increased drilling rates. With products from Iran cut off, demand for Venezuelan crude has soared. The country is now operating at its maximum efficient rate.

Evolution of Oil

Chemists share knowledge and theories in effort to solve oil's biggest mystery at huge three-decker world meeting

George Weber

NEW YORK. — How oil originated millions of years ago and how the latest products of atomic fission can improve its processing indicate the range of petroleum subjects being discussed at a mammoth, three-decker chemical confab this week and next.

The occasion is the World Chemical Conclave, which combines the Diamond Jubilee of the American Chemical Society, the Twelfth International Congress of Pure and Applied Chemistry, and the International Union of Pure and Applied Chemistry.

Oil's origin.—A.C.S. led off the oil talks early this week with a symposium on the origin of petroleum which brought together conclusions, speculations, and controversial opinions on the origin, transformation, and accumulation of oil in the earth. The premise is that greater knowledge of the formation of petroleum will lead to better ways and means of locating oil fields.

Late this week another A.C.S. symposium will be a monumental review of the past quarter-century's progress in the technology of petroleum refining.

Refining progress. — The petroleum-chemistry section of the International Congress will spend 4 days next week discussing petroleum technology and products derived from petroleum.

Subjects include the use of isotopes in studying catalysis, experimental thermal and catalytic cracking at high temperatures and high space velocities, naphtha-reforming catalysts, polymerization of mono-olefins, catalysts for hydrocarbon synthesis, preparation of pure aromatic hydrocarbons, and the future of chemicals from coal and petroleum.

The International Union, holding its sixteenth biennial conference, is concerned chiefly with setting uniform chemical standards for the scientists of the world in such fields as atomic weights, nomenclature, toxicology, and radioactivity.

What made it.—The symposium on the origin of oil brought out a general agreement that petroleum was formed originally from organisms of animal or vegetable form, but there was no unanimity of opinion regarding the transformations which these organic residues underwent before becoming petroleum.

It is generally conceded that the living organisms whose remains provided the source materials were the simplest of living forms, probably marine plankton and bacteria.

J. C. McNab, P. V. Smith, and R. L. Betts of Standard Oil Development Co., in their paper entitled "The Evolution of Petroleum" concluded from an extensive study of available information that the origin and evolution of petroleum embodies three distinct steps or phases.

These include accumulation of organic matter in marine or brackish-water sediments; transformation of the organic matter, or part of it, to a heavy bitumen-like material or embryonic petroleum; and maturing of the primary petroleum.

Natural cracking.—In the opinion of these authors, a portion of the organic matter, composed of high concentrations of naphthene rings and paraffinic links or chains, cracked under the increased temperature and pressure attending subsequent deeper burial, and formed the heavy origin oils. These were squeezed out of the compacted, fine-grained rocks in which they were originally deposited, and accumulated by migration to porous reservoirs.

Containing little or no low-molecular-weight hydrocarbons, they are then believed to have undergone low-temperature cracking or hydrocracking, aided by catalytic action of the reservoir rock. The primary formation of the heavy oils from organic deposits may have taken 1 or 2 million years, while the subsequent evolution or maturing to higher-gravity oils occurred over the remainder of geologic time which, in Paleozoic crudes, ranges up to an estimated 500 million years.

From studies of the crude-oil assay data of the Bureau of Mines, the authors developed theories of this maturing of heavy source petroleum. Using 30° A.P.I. as the division point between light and heavy crudes, they found that 112 Tertiary crudes, in reservoirs ranging in age from 11 to 74 million years, showed a ratio of high-gravity to low-gravity crudes of 62:38, compared with a like ratio of 88:12 for 106 crudes found in Paleozoic formations of 200 to 500 million years in age.

The investigators carried out laboratory thermal cracking studies on McMurray tar-sand oil, representing a "young" oil. Their results indicated that at 150° F. this oil would not be changed significantly in geologic time in the absence of mildly catalytic materials for at least a portion of the time.

Rock catalysts.—The role of catalysis of formation rocks was supported by Benjamin T. Brooks, consulting chemist of New York. He concluded that the low pressure and temperature occurring in petroleum reservoirs preclude a change in oil composition except through the action of mineral catalysts. The differences in catalytic activity of acid silicate minerals, particularly clays as contrasted with clean quartz and limestones, are believed to account for the differences in the composition of oils of the same age and temperature history. Recent Gulf Coast geologic studies support this conclusion, Brooks said.

The possibility that radioactivity also had a hand in transforming marine organic materials into petroleum was presented by Irving A. Breger and Walter L. Whitehead of Massachusetts Institute of Technology.

Bacteria catalysts. — Present knowledge leaves ample room for bacteria to play at least a strong supporting role in the generation of petroleum hydrocarbons, stated R. W. Stone and Claude E. ZoBell, of Pennsylvania State College and Scripps Institute of Oceanography.

Radioactive Acidizing

Dowell, Radioactive Products develop new process using isotopes of iodine to control oil-well acid treatments

Kenneth B. Barnes

TULSA. — Radioactive isotopes produced at the atomic-energy plant at Oak Ridge, Tenn., are now being used experimentally in the control and evaluation of oil-well acidization treatments.

The isotopes are Iodine-131 (molecular weight).

Some three dozen acidizing jobs using the radioactive "tracers" have been performed on oil wells producing from the Kansas City-Lansing and Arbuckle limestones in western Kansas and in dolomitic wells in the Seminole area of Oklahoma.

Use of the radioactive materials in hydrochloric acid oil-well treatments follows more than a year of research

carried on jointly by Dowell Incorporated and Radioactive Products, Inc., of Detroit, Mich.

How it works.—Radioactive "Iodine-131" emanates gamma rays, and these rays penetrate steel tubing used in wells in connection with the acidizing process. With part of the acid during a well treatment being on the outside of the tubing, a Geiger counter lowered by cable inside the tubing can pick up the level of the radioactive acid as it rises in the annulus. In the new practice, no round-trips of the tubing need be made preparatory to acidizing.

After completion of the acidizing the Geiger counter can be moved up and down inside the tubing by the cable to measure the induced radioactivity of the formation at each pay zone penetrated by the acid. This feature makes it possible to ascertain definitely which pay zones "took" the acid, and what formation intervals did not receive acid penetration.

Pilot truck.—To conduct the new radioactive acid treatments, Dowell employs an electric pilot truck containing a special type Geiger counter, lowering cable, and recording equipment.

At the well site the Geiger counter is lowered in the well, and radioactive acid is pumped down the tubing. As acid is pumped into the well, it rises in the annular space around the tubing.

When this acid is in contact with the formation it reaches the level of the Geiger counter. The meter in the cab of the pump truck swings quickly across the scale. This indicates to the engineer operator that the acid has reached the desired level.

A second pump is started to increase the pressure on the liquid in the annulus. This forces the acid into the porous formation. By adjusting the speed of the two pumps it is possible to "jockey" the level of the acid up or down and to hold it exactly at the desired level during the treating process.

After completion of the acidizing, water is flushed through the tubing to wash out the last traces of the radioactive acid. The Geiger counter is then lowered to the bottom of the well and the radioactivity of the formation recorded at each level.

A detailed engineering article covering the many newly developed applications of radioactive materials in several branches of the petroleum industry will be published in the Journal in a future issue.

Lease Sale Scheduled

WASHINGTON. — Approximately 1,300 acres of oil and gas lands in five states are being offered for lease by the Bureau of Land Management.

The bureau will open bids September 19 on 35 acres in Midway field, 30 miles west of Bakersfield, Calif.; 119.86 acres in Monument-Jal field, 40 miles south of Hobbs, N. M.; and 240 acres in lots of 80 and 160 acres, respectively, in Pine Mountain field, 30 miles northwest of Casper, Wyo.

On September 26, bids will be opened on three parcels of 152,232, and 40 acres, respectively, in North Baxter Basin field northeast of Rock Springs, Wyo.; two parcels of 200 and 160 acres, respectively, in Powder Wash field, about 50 miles northwest of Craig, Colo.; 76.5 acres in North McCallum field, 5 miles northwest of Walden, Colo., and 40 acres in Hugoton gas field, 13 miles west of Lakin, Kans.

Leases will be awarded to the qualified bidders of the highest bonuses at the usual rental and royalties ranging from 12½ to 25 per cent on oil and 12½ to 16⅔ per cent on gas.

GULF COAST

Injection Success

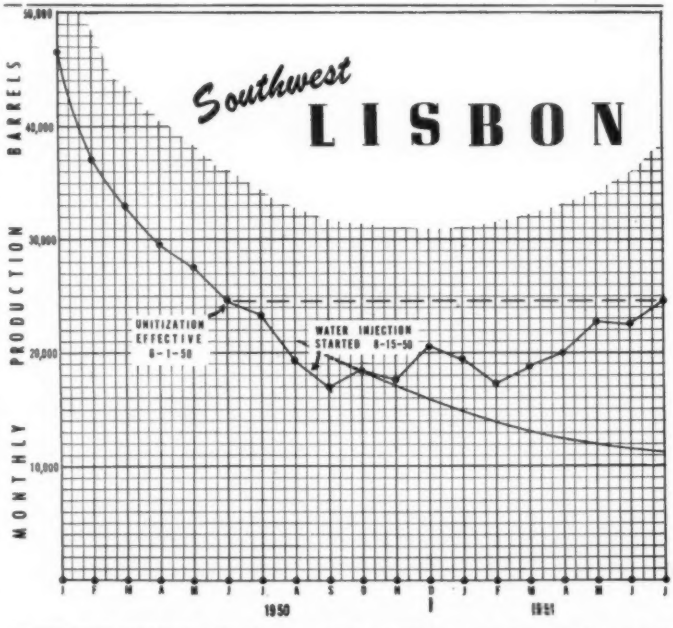
Water flooding of Pettit lime in Southwest Lisbon field more than doubles ultimate crude recovery within a year

SHREVEPORT.—A water-flood project initiated at Southwest Lisbon field near here about a year ago already has increased production of the field to more than twice what it would have been under normal depletion.

This is the second Pettit lime flood to prove successful recently in Claiborne Parish of North Louisiana. Results of a similar and earlier flood in Haynesville field also were highly gratifying.

Southwest Lisbon's production in July was 24,485 bbl. This is about 13,500 bbl. more than the 11,000-bbl. estimate of production based on rate of decline during the same period without the water-injection program. The field also produced more in July 1951 than it did when unitization became effective in June 1950 (24,466 bbl.).

The flood, started August 15, 1950, recovered an estimated 58,548 bbl. of crude by August 1 of this year that otherwise would still be in the ground.



***PRODUCTION PORTRAIT.**—Graph shows Southwest Lisbon production declining sharply from January 1950 to initiation of water flood in August then climbing until, by the end of July 1951, it equaled production in June 1950 when unitization became effective. Straight black line pictures normal rate of decline as it would have appeared without the injection.*

Central pattern.—Midstates Oil Corp., unit operator, is employing five injection wells located in the center of the field to sweep oil simultaneously toward 67 producing wells to the north and south. Flood water is obtained from two Wilcox water wells. Midstates plans an ultimate injection rate of 10,000 bbl. daily.

Description.—The Southwest Lisbon Unit comprises about 3,000 acres. This takes in parts or all of 16 sections in Township 20n-5w, including Sections 9, 10, 13-17, 20-24, and 26-29.

Midstates Oil Corp. 1 R. D. Baker, SW NE 15-20n-4w, is considered the discovery well for the field, although there were other wells completed prior to its discovery in the north half of Section 15. The 1 Baker was completed in December 1947.

The unit is located on a local nosing on the extreme southwest flank of the North Lisbon structure coming from a stratigraphic trap in a porous lime member of the Sligo formation.

The reservoir is restricted and defined on the west and northwest by a shaling out of the lime section and limited and defined on the southwest and south by lack of permeability. To the north and northeast it is defined by a barrier caused by the pronounced restriction of the lateral extent of the porous lime section. Again on the east and southeast the reservoir is limited by shaling out of lime section.

Unit history.—Louisiana's Conservation Department approved unitization of the Pettit lime reservoir at Southwest Lisbon and authorized water injection in an order May 22, 1950, after a hearing held in Homer, La., March 28, 1950. Order was effective June 1, and Midstates was named operator.

When the hearing was held, institution of secondary-recovery operations was expected to boost ultimate recovery by 250 per cent. The final yield was expected to be 3,720,000 bbl. by primary recovery plus 5,750,000 bbl. by water flood for a total of 9,470,000 bbl.

Percentagewise, 16.5 per cent of the original oil would be recovered by normal depletion, 25.5 per cent by water flood for an estimated ultimate recovery of 42 per cent.

Peak production from Southwest Lisbon was reached in January 1949 when 42 wells produced 103,000 bbl. A year later, even with a sharply climbing well-completion rate, production was decreasing at an equally sharp rate. It was then that decision was made in favor of the water-injection project.

Gas Ruling Requested

ARANSAS PASS, Tex.—United Carbon Co., Inc., operators of a carbon-black plant near here, have requested a ruling from the Railroad Commission which would permit the utilization of gas from several nearby Aransas County fields.

Texas regulations require public hearings to be held whenever gas is used for producing less than 5 lb. of black per M.c.f. of gas. If it is found uneconomical to process natural gasoline from the gas, the go-ahead is usually given to carbon-black plants.

The gas in question will test in excess of 1½ gal. of propane plus per M.c.f. United contends that production of natural gasoline from the gas will be uneconomical.

United has completed contractual agreements with operators in Fulton Beach, West Fulton Beach, Copano Bay, and Salt Lake fields for the purchase of casing-head gas for a period of 10 years.

Industry Briefs

WASHINGTON.—E. Carl Mattern, district director of the Oil Workers International Union, Dallas, has been named a consultant to PAD on labor matters. Mattern, who worked in the oil fields before becoming a union representative, served as a member of panels established by the War Labor Board in 1943 to determine wage rates in well-drilling and rig-building operations.

TEXAS CITY.—Bulk oil shipments through the port of Texas City reached an all-time monthly high in July according to figures released by Texas City Terminal Railway Co. A new record of 8,716,903 bbl. was shipped. Of the total of 452 ships which moved through the port, 248 carried 380,276 tons in-bound and 132 out-bound vessels carried 961,434 tons.

HOUSTON.—A plan subject to stockholder's approval, has been revealed for the merger of Diamond Alkali Co. and the Kolker Chemical Works, Inc. Diamond has 12 plants, among them a $16,000,000 plant here which produces caustic soda, soda ash, and chlorine. Kolker also has a plant in Houston which produces benzene hexachloride and DDT. Value of these installations is in excess of $1,000,000.

WASHINGTON.—PAD has opened a special office in Kansas City, Mo., to aid oil and gas operators affected by the recent flood. Herman J. Herzog, materials division, will head the office and make a survey of the damage done by high water, passing on to Washington recommendations for priorities assistance to operators needing materials for repair. Operators seeking assistance should apply to Herzog's office in the Pickwick Building, 903 McGee Street, furnishing information of the extent of their loss due to flood, the amount of equipment still available and in condition to be used, and the minimum requirement of materials needed for rehabilitation.

BORGER, Tex.—Phillips Chemical Co. is continuing production of synthetic rubber here despite a series of explosions which ripped through the butadiene-manufacturing section of the plant Saturday. All but the damaged "stage four" section is back in operation and rubber-production levels will be maintained on reserve stocks of butadiene. Estimates of damages caused by the unexplained blast, which injured 11 persons, will not be made until engineers now on the scene complete their survey.

WASHINGTON.—PAD has moved its New York office to Room 906, 270 Park Avenue, from 1934 Broadway. The new telephone number of the office is Murray Hill 8-5150.

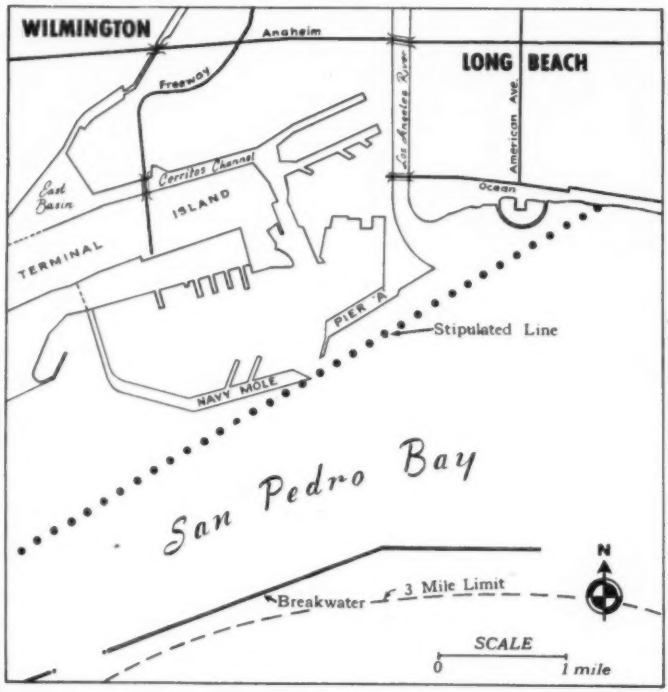
TULSA.—Sunray Oil Corp. has purchased 100 tank cars from a West Texas refiner and has placed them in service from Sunray's Duncan, Okla., refinery. The cars augment the 200 new L.P.G. tank cars bought by Sunray earlier this year and placed in service this summer.

WASHINGTON.—Interior Secretary Oscar L. Chapman has tentatively accepted an invitation to attend the Venezuelan petroleum convention at Caracas September 8-18. If he goes, Chapman will be a member of the United States delegation, other members of which will be Deputy Petroleum Administrator Bruce K. Brown and Assistant Deputy Administrator C. Stribling Snodgrass.

WICHITA.—The Kansas Corporation Commission has set the September allowable at 310,000 bbl. daily, a figure unchanged since May. Nominations of purchasers were 348,380 bbl. daily, compared with 347,322 for August.

WASHINGTON.—It took 533,000,000 M.c.f. of natural gas and 2,300,000,000 gal. of fuel oil, together with 92,500,000 tons of coal, 62,700,000 tons of coke, and 24,700,000,000 kw. of electric current to process the 119,000,000 tons of iron ore refined by the iron and steel industry last year, according to the American Iron and Steel Institute. All of the figures were new highs for the industry.

SAN FRANCISCO.—American Bitumuls & Asphalt Co., which formerly operated only east of the Rocky Mountains, is acquiring the assets of Stancal Asphalt & Bitumuls Co., which has operated only in the west. Both are subsidiaries of Standard Oil Co. of California.



PRODUCTIVE AREA.—How to produce the untouched oil in this area is a long-discussed question of West Coast oil men.

Development Problem

Big islands, little islands, breakwater sites, and a mining method proposed for tapping San Pedro Bay reserves

D. H. Stormont

LONG BEACH.—The best method of developing large oil reserves in San Pedro Bay is again becoming a favorite discussion topic of the Long Beach oil fraternity.

Reason for this long-standing discussion agai.. coming to the forefront is the possibility Congress may restore the oil-rich tidelands inside the 3-mile limit to their original owner. Also, the Supreme Court, which is expected before the end of the year to rule on just what constitutes the boundaries of San Pedro Bay, may by its decision return the disputed area to the city of Long Beach.

There is little question that additional oil reserves, constituting an easterly extension to Wilmington field and consisting of possibly a quarter-billion barrels, lie inside the outer harbor breakwater running about 3 miles offshore.

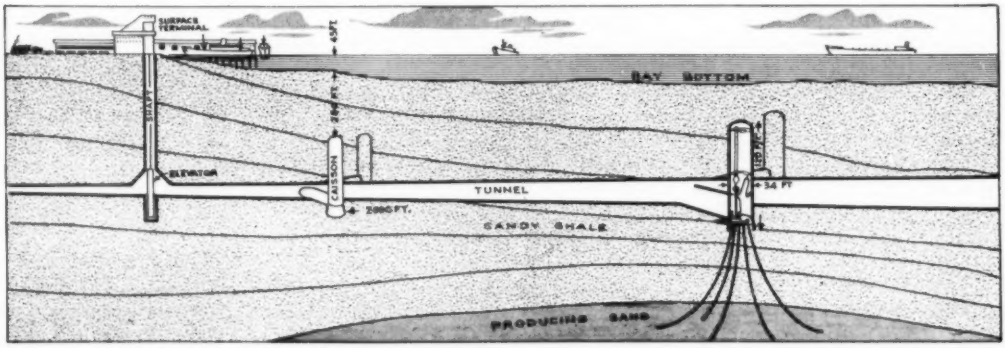
Presence of a large structure extending eastward several miles beyond the stipulated line, and well offshore, was confirmed by an aerial magnetometer survey completed this summer.

In the Terminal Island area of Wilmington seven zones have been developed, and of these four are known to extend beyond the stipulated line. Contour maps indicate the pools being developed in the Tar and upper and lower Terminal zones do not extend too far beyond the line. However, if only the Ranger zone is present east of the line its estimated yield of 50,000 bbl. per acre is expected to result in a new reserve of some 200 million barrels. If any of the other pays are present, as would be expected, the potential oil reserves may well greatly exceed a quarter-billion barrels.

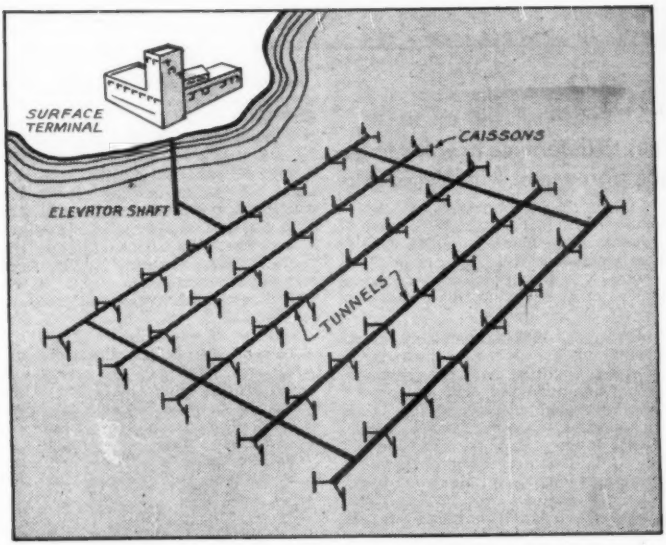
These reserves largely are beyond reach of wells drilled from existing harbor fills. Nor can they be reached easily from the breakwater. Likewise, city ordinances prevent their being reached from beach or town-lot drill sites.

Just how these reserves could best be developed is the question being debated. Several methods are under discussion.

Big-island plan.—The plan advanced by many engineers as being the most practical is to create a few large



MINING METHOD.—This drawing illustrates the unusual method proposed by H. A. Hansen for tapping the oil lying outside the reach of wells drilled from harbor fills.



***SUBSEA NETWORK.**—Hansen's plan would involve digging a pattern of tunnels under the harbor as shown here, with laterals leading to caissons in which drilling would be accomplished.*

islands, covering several acres, from each of which 500 or more wells could be drilled.

So placed that they would not menace navigation, it is believed Army engineers would not object. When landscaped to look nature-made, the beach city's residents should not complain.

This method of development, of course, would involve extensive directional drilling. However, because of progress made in slant-hole techniques in recent years this is not expected to cause too much difficulty. Directional-drilling tools now available permit the degree of slope to be built up at the rate of 7° per 100 ft. up to angles of more than 75°. At Huntington Beach some wells reportedly have been carried at average angles in excess of 70° for horizontal deflections of more than 7,000 ft.

Small-island proposal. — Another method would make use of many small islands from each of which 15 or 20 wells could be directionally drilled.

Since much of the bay area is only 40 to 50 ft. deep, construction of these small-island drilling platforms could be readily accomplished. Chief drawback to this plan is that it is believed Army engineers would frown upon the islands as a menace to navigation. Especially so if some 50 or 100 such platforms should dot the bay area.

Breakwater blisters. — A third idea would utilize the outer harbor breakwater, from which holes would be slanted back toward the shore.

Use of the breakwater as a base to which "blisters" would be added as drill sites is thought to have the limitation that the entire area could not be developed.

At nearby Huntington Beach, leases which begin 1 mile offshore and extend 1 mile farther out currently are being developed from shore sites. In developing horizons at about 3,500 ft. deep, however, maximum horizontal deflection is thought to be about 1½ or 2 miles. Thus possibly only the southern portion of the extension area's deeper pays and very little of the shallower zones could be developed from the breakwater.

Miner's method.—Still another plan, dubbed the "gopher" method, would involve use of tunnels and laterals which would run to underwater domes tall enough to house a derrick.

This method was developed by H. A. Hansen, Long Beach geologist-engineer, about 10 years ago. His plan is to sink a vertical shaft to a depth of about 400 ft. below the bottom of the bay. From the base of this shaft, main tunnels would be driven laterally under the bay floor to provide a subterranean network over the oil-containing area. Leading from these access tunnels would be shorter ones at the ends of which would be built steel and concrete caissons in which drilling would take place.

Each caisson, 34 ft. in diameter and about 120 ft. high, would provide the site for drilling 20 wells to drain about 100 acres. Fifty or more of these cylinders might be required, spaced about 2,000 ft. apart, according to Hansen's plan. Top of the caissons would be 280 ft. beneath the bay bottom. They, as well as all tunnels, would be air-conditioned.

Many engineers do not agree with Hansen's opinions as to the method's practicality and safety. They point out that the unconsolidated nature of the shales and sands in which the tunneling would take place would make it difficult to mine out the space for the caissons. On a cost basis they do not believe it can compete with a plan making use of large islands and extensions of existing harbor piers.

Ownership questions.—The limits of San Pedro Bay were first established by a committee of the Fifty-first Congress as the line running from Point Fermin to Newport Beach.

In the late thirties, for purposes of regulating the activities of gambling ships lying offshore from Long Beach, a federal court defined the bay as being inside the Point Fermin-Point Lausen line. In 1947 when the Government began seeking title to the tidelands, the dividing line proposed was just beyond facilities of the port of Long Beach.

Insofar as the city's claim to ownership is concerned, California in 1911 gave Long Beach title to tidelands out to the 3-mile limit as shown on the map. However, since the question of ownership arose, development of the tideland portion of the Wilmington field has been kept landward of the stipulated line.

CANADA

Product-Line Start

TORONTO.—Construction of the 64-mile Sarnia-to-London, Ont., section of the Sarnia-Toronto products pipe line of Imperial Oil, Ltd., will begin within 2 weeks.

Construction will be initiated about the same time on the line's London terminal by Shaw Construction Co. of Sarnia. Both projects are scheduled for completion in December.

The London-Toronto section and the spur line to Hamilton will be built next spring. Contract for construction has been awarded to Comstock Midwestern, Ltd., Leaside, Ont.

The 132-mile section of line from Sarnia to Waterdown will be 12-in.; the 56-mile Waterdown - to - Toronto section will be 10-in.; and the Hamilton spur will consist of two 6-in. lines. The completed line will have an initial capacity of 39,000 bbl. per day of gasoline, kerosine, and heating oils.

Imperial's London terminal will be built adjacent to the proposed marketing bulk plant northeast of the city. It will house all metering equipment for recording volumes of gasoline and other products taken from the line for use in the London area.

New Trade Pact?

Government schedules hearings to determine how far to go in liberalizing reciprocal-trade agreement with Venezuela

WASHINGTON.—Preliminary steps toward the negotiation of a new reciprocal-trade agreement with Venezuela have been taken by the Tariff Commission and State Department.

A public hearing will be held by the commission October 2 in connection with its investigation under the recently amended Reciprocal Trade Act to determine the "peril point" below which import excise taxes on foreign petroleum cannot be reduced without serious injury to the domestic industry.

C.R.I. meeting. — Coincidentally, the Committee for Reciprocity Information will hold hearings September 9 at which domestic producers and exporters and importers of petroleum, iron, and iron ore will be afforded an opportuntiy to submit their views as to concessions the United States might make to Venezuela on those commodities.

Domestic interests will be given an opportunity to submit their views on both the rate of tax and quota restrictions by either letter or personal appearance before the Tariff Commission.

The information sought by the commission includes trends of domestic production, sales and imports, including data on recent developments; the competitive strength of foreign and domestic oil in our markets during a period which is representative of conditions of competition; the geographic areas of greatest competition between domestic and imported oil and the principal markets; costs of production of foreign and domestic oil and trend in costs of importation of the former; and additional information of a factual character bearing on the position of the domestic industry in competition with imported oil.

Petroleum, iron, and iron ore are the only products which the State Department has announced will be considered in negotiating a new agreement with Venezuela. The iron industry is new in that country and in view of our increasing dependence upon outside sources of supply as a result of the war-accelerated depletion of our domestic reserves, it is probable that concessions will be granted on both iron and ore.

Oil uppermost.—Petroleum, however, was the commodity with which Venezuela was most concerned in seeking to have its 1939 trade agreement rewritten. Primarily, elimination of the quota restrictions is sought because of the fact that under its profit-sharing agreements with the American companies the Venezuelan Government is losing 5 cents on every barrel of oil entering this country in excess of the quota.

Under the 1939 agreement, a quota system under which the import excise tax would be halved on imports amounting to 5 per cent of our refinery throughput was set up. This was satisfactory to Venezuela, which then was the only important seller in the United States market. Under a trade agreement with Mexico entered into in December 1942, however, the quota system was eliminated and all imports were given the lower tax.

Venezuelan dissatisfaction with the 1939 agreement developed last year when the Mexican treaty was canceled. At that time the State Department requested the Venezuelan Government to submit its views on how the quota, which automatically would be reinstituted, should be applied. There was much discussion, but Venezuela, which at one time considered abrogating its agreement because of the quota, did not come forth with any new formula and almost at the last minute agreed to its application on the basis of past imports. Under that system, 59.4 per cent of the quota was assigned to Venezuela amounting this year to 2,613,137,096 gal., all of which was imported before the end of June.

Facing the loss of several million dollars in profits through the increased import tax which would apply to its oil through the remainder of 1951, Venezuela made formal request for modification of the agreement to conform to new conditions. The State Department announced on June 18 that it had acceded to that request.

Sucker-Rod Saving Urged

WASHINGTON.—With nickel allocations for the oil industry due to be cut back because of expanding military requirements, the Petroleum Administration is calling on operators to conserve for maximum use sucker rods made of nickel-bearing steel.

An expected 30 per cent cut in the availability of such rods will demand their conservation for use where neither carbon steel or protective-coated rods can be used, it was declared by Deputy Administrator Bruce K. Brown.

About 50,000 tons of sucker rods were used by the oil industry last year and the same amount is estimated for this year, but 1952 requirements will be about 52,000 tons, Brown said. About 50 per cent of the rods are made of nickel-bearing steel, for which about 400 tons a year of nickel is required. The nickel-steel rods are required in wells where oil has a high sulfur content resulting in excessive corrosion or where the depth of the well or other factors subject rods to an unusual strain.

Because of expanding military requirements for nickel, the word already has gone out to sucker-rod manufacturers and PAD that the amount of metal to be made available will be cut back to a maximum of 35 per cent of total rod tonnage.

The remaining production will be from carbon steel, except to the extent that other suitable alloying materials can be used, Brown said. Rod manufacturers are experimenting with substitutes for nickel, but until these can be developed oil operators should make every effort to conserve their supplies.

Brown suggested that operators try the use of protective coatings for rods—on which some experimenting is now going on.

TEL Output Hit

Octane cutback forecast for civilian motor fuel

WASHINGTON.—Octane ratings of civilian gasoline likely will have to be reduced due to the National Production Authority's sharp September cutback in the allocation of lead for manufacture of tetraethyl lead.

With the two manufacturers of TEL, Ethyl Corp. and du Pont, facing a cut to possibly as little as 50 per cent of estimated lead needs for the month, Petroleum Administration officials are facing the prospect of having to impose stiffer restrictions on TEL consumption by refiners.

NPA attributed the reduced allocation to dwindling production of domestic lead, magnified by the lack of incentive for marginal operations, and to the difficulty of securing adequate imports because of the higher price of the foreign product.

PAD officials said the brunt of the cut will fall upon the civilian motorist. Aviation gasoline, both military and commercial, must be provided and military demand has materially increased. This imposes a strain upon alkylates which many refiners are blending to maintain high-octane values in civilian motor fuel.

Dual threat.—Civilian gasoline, accordingly, faces the dual threat of

less TEL and less alkylate, but PAD so far has not come to any conclusion as to just what the result will be nor what steps should be taken to meet the situation. It is generally conceded, however, that unless PAD is successful in its plea for better treatment a drop in octane values is definitely in prospect.

There are indications that if further restrictions in lead are required, PAD will have to decide whether it is to stiffen the order issued last March 1, limiting refiners to a percentage of their TEL consumption last year, or revive the original and abandoned proposal to impose ceilings on octane values of house-brand and premium gasoline.

The octane-ceiling proposal was opposed because alkylate could be used to help maintain octane values, but if the octane supply now is curtailed there could be a diminution of that opposition.

Meanwhile, NPA metals experts believe the lead shortage could be eased if the Office of Price Stabilization would raise the ceiling price of the metal. The price now, it is said, is so low that there is no encouragement for high-cost marginal production, and imports of sizable amounts are impossible. OPS, however, has so far shown no indication of moving to spur production through price improvement.

400 Out of Luck

Operators file too late for fourth-quarter steel

WASHINGTON.—More than 400 oil and gas operators will be without allocations of tubular goods for the fourth quarter as a result of their failure to file applications in time.

A National Production Authority order required that applications on Form PAD-17 be filed by June 30. Approximately 3,050 operators got under the wire and their applications were processed, but the Petroleum Administration for Defense could do nothing for the 400 who came in late.

First - quarter deadline. — Because of this experience, PAD officials are anxious that every operator realize that the PAD-17 applications for first-quarter, 1952, allocations must be in the mails by midnight September 30. And they emphasized that means they must be in the post office, and must show a September 30 cancellation.

The September 30 deadline was set by NPA because it takes considerable time to process all applications and work out individual allocations sufficiently in advance of the beginning of the quarter to meet steel-mill requirements for a 60-day lead time. This means that PAD's production division will have to work night and

WATCHING WASHINGTON

Bertram F. Linz

What's a Small Business?

National Production Authority, after digging into the matter for about 6 months, has come up with a workable definition of a "small business."

The Defense Department, generally, has been holding that any establishment with less than 500 workers is a small business, but NPA found that there are whole industries in which there is no plant that large.

NPA is interested because it has to see that small plants get a fair share of scarce materials, accordingly, it has adopted the new classification. It sets up criteria for each industry under which that group of smallest plants which produce one-third of the total output of an industry is classified as small business.

Under this concept, any oil refinery with less than 500 employes is a small establishment, for census figures show that such plants produce 34 per cent of the industry's output. Any plant producing miscellaneous lubricants with less than 100 employes is small, and in synthetic rubber, a small business is one with less than 350 employes.

At the top of the list, any plant with less than 2,500 workers is a small establishment in the aircraft and locomotive industries. NPA quit there—any plant with 2,500 or more employes is a big one, no matter how you look at it.

Dispersal Dogfight

A whale of a political fight is going on in Washington over President Truman's program for the dispersal of industry. Its critics are charging it's a move to use government loans, material allocations, and certificates of accelerated amortization to force the location of industrial plants where government officials want them.

So hot is the row that the President issued one of his infrequent formal statements to explain that it's nothing of the kind and should cause no great concern to the oil industry or any other.

It is true that common sense and experience in the last war saw that new industrial centers cannot be created in nonindustrial areas without great relocation of labor with attendant problems of housing, transportation, etc.

Nothing like that is contemplated in the dispersal plan, according to the President's statement. It merely means that a large plant should be built a few miles away from the nearest existing large plant, so that an attack on one would not destroy both.

All administration officials emphasize they are not calling for any drastic shuffling of the oil or or any other industry.

The President says the requirements of the dispersal program can be met even in such highly industralized centers as New York, Chicago, or Detroit. Hiroshima and Nagasaki demonstrated that the effects of even atom bombs are limited by hills as well as distance. Putting an industrial plant on the far side of the next hill or a few miles off might spell the difference between destruction and continued war production.

The Economical Diesel

Diesel locomotives now are hauling trains for less than half the fuel cost of steam engines, and thereby saving millions of dollars monthly for the railroads.

With the diesel-electrics now handling more than half of the traffic, the railroads are beginning to get detailed figures on operating costs under regular operating conditions. The Interstate Commerce Commission also is gathering statistics, since fuel costs are a factor in figuring freight and passenger rates.

An analysis of Class I railway operations for the first 4 months of this year emphasizes the superiority of the diesel both from the standpoint of fuel costs and the equally important standpoint of overhaul time and frequency.

From the fuel standpoint, it was found that 48.1 per cent of the freight traffic was handled by diesel-electric locomotives for 30.8 per cent of the railroads' total outlay for fuel. Coal-burning locomotives handled 39.4 per cent of the traffic but accounted for 50.7 per cent of the fuel cost.

Translated into dollars, this meant that it costs only $42,400,000 to move nearly half of the freight traffic by diesel while it cost $69,900,000 to handle considerably less of it by coal.

Carrying the analysis a step further, it was found that diesel locomotives in road freight service consumed fuel at the average rate of 1.7 gal. per 1,000 gross ton-miles of service. On this basis, a diesel locomotive hauls about 2¼ tons 1 mile on a tablespoonful of fuel.

day to process nearly 3,500 applications and get their allocation notices to operators during the last week in October.

Production-division officials made a number of recommendations to operators who will file next month. The PAD-17 form should be accompanied by the inventory report on PAD-16, showing stocks of casing and tubing as of September 20. Operators who drilled 40 or fewer wells during the preceding four quarters also must file Form PAD-32, reporting wells completed during the third quarter of 1951 and how casing and tubing allotted by PAD were used.

Beside getting their applications in in time, operators should be as accurate as possible in reporting both their inventories and the footage and tonnage of tubular goods used. Some 700 PAD-32 reports had to be returned for correction during the processing of fourth-quarter applications, thereby seriously delaying the agency.

1952 Steel Needs

PAD says 10,000,000 tons required by oil industry

WASHINGTON.—Initial Petroleum Administration estimates of the oil and gas industry's 1952 steel requirements total close to 10,000,000 tons and may be 500,000 to 750,000 tons greater when all details are worked out.

PAD has asked the Defense Production Administration for an allocation of 9,897,000 tons, and conferences between the two agencies will start next week. An October 8 deadline has been set by DPA for final determinations of programs.

However, efforts will be made later to secure increased supplies of plate and oil-country tubular goods, the former possibly in the range of 200,000 tons a month. This amount is judged necessary if the industry is to increase its production beyond the 1,000,000 bbl. daily set as the original expansion objective.

For the production branch of the oil industry, PAD is asking 2,085,000 tons of steel, including 134,000 tons for maintenance, repair, and operation. For production of natural gas, including liquefied petroleum gas, it is asking 444,220 tons, including 22,440 tons for MRO.

The estimate for supply and transportation is 1,833,210 tons, including 99,410 tons for MRO, and for gas transmission it is figured 2,675,800 tons will be required, including 125,600 for MRO.

Refining requirements are placed at 621,000 tons of which 105,200 tons would be for MRO, and 921,700 tons has been asked for production of oil-field machinery and equipment.

Other estimates include 52,000 tons for marketing, 309,600 tons for use in Canada, and 862,000 tons for use in other foreign operations.

New Forms Out

Leases, assignments, and bond executions affected

WASHINGTON.—New forms for oil and gas leasing, assignments, and bond executions are now being distributed through the land offices of the Bureau of Land Management, in conformity with revised regulations approved by the Secretary of Interior July 23.

A combined lease-for-oil-and-gas and offer-to-lease form differs from those previously used in several respects. One important change is the omission of the requirement for evidence of citizenship of married women and naturalized citizens, since such verification is required when production is obtained under a lease or is allocated to it.

In addition, the "royalty on production" provision has been modified with respects to discovery royalty rates in Alaska on lands in an approved cooperative or unit plant.

Finally, the instructions have been amended to provide that, in the event a defective offer is filed, the land office will retain the filing fee and first year's advance rental or any other amount that may have been paid to be credited to any new offer filed within a period of 30 days. The offerer, however, obtains no priority through the earlier filing.

Bond forms.—Two nation-wide bond forms have been provided to enable individuals or companies operating on public or acquired federal lands in more than one state or territory to be covered by one bond. The amount of this bond will vary with the number of states in which operations are undertaken and also with the laws of these states.

The bond may also be used by an operator or lessee who holds a number of leases in a single state or territory. A $25,000 bond will cover liability under a number of leases in each state or territory under either the Mineral Leasing Act or the Mineral Leasing Act for Acquired Lands. However, a $50,000 bond will be required for coverage under both acts in one state.

A new assignment form is provided exclusively for transfers of record title to all or part of an oil and gas lease but not for operating agreements, working interests, or royalty interests. Use of this form is not mandatory, but the bureau is encouraging its use in the interest of convenience and efficiency.

Fast Tax Writeoffs O.K.'d

WASHINGTON.—Two more projects for expanding petroleum-products production were approved by the Defense Production Administration as a 60-day suspension of certifications for accelerated amortization went into effect.

Humble Oil & Refining Co. was given certificates for quick writeoff of 55 per cent of $900,000 and 10 per cent of $4,071,000 of a $4,971,000 project for production of aviation gasoline at Baytown, Tex., and another certificate for 50 per cent of a $70,400 project for production of turbo fuel at the same plant.

New Defense Orders

WASHINGTON.—The following orders have been issued by the National Production Authority:

Schedule 9 to M-45, August 29: Placing methylene chloride under allocation.

M-21, revoked August 29: Covering methylene chloride now under M-45.

Amendment to Reg. 5, August 29: Providing for appeals by manufacturers using steel, copper, aluminum or other scarce material under NPA allocation from denial of applications for adjustment of allotments and allocations.

Amendment to M-2, August 29: Relaxing controls on rubber.

M-82, August 31: Providing for maintenance of reasonable inventories by distributors of brass mill products.

Direction 4 to M-11, August 31: Providing that producers of copper controlled materials may not fill any orders other than authorized controlled-material orders after October 1.

ROCKY MOUNTAIN

Large Basin Area Sold

Deep Rock Oil Corp. has sold leases on 170,000 acres, or about half the company's holdings in the Williston basin, to Champlin Refining Co. Amount involved in the transaction, paid in cash, was not disclosed.

The sale involved acreage in 21 North Dakota and 4 Montana counties, including both blocks and checkerboard leases.

An announcement by J. Lawrence Muir, Champlin executive vice president, and John L. Ferguson, Deep Rock vice president in charge of land and exploration, said both companies plan to carry on active leasing, exploration, and development programs in the basin.

PLENTY WET.—This is the Kansas City, Kans., refinery of Phillips Oil Co., shown during the flood. The refinery's large catalytic cracking unit may be seen in the foreground. Also shown are the lubricating-oil plant, the compounding plant, and part of storage. Most of the other plant facilities also were in the flood area.

Plant Rehabilitation

Procedure at Phillips refinery shows how management and employes met a major emergency—the Kansas City flood

Few refiners ever expect to have flood problems to solve but all are confronted in these times with the possibility of major emergencies at their plants for which they would not be responsible and over which they have no control but which require quick action to minimize losses to life and property.

This report gives a chronology of what happened at the Kansas City, Kans., refinery during the recent flood, starting with the first threat of trouble and carrying through the rehabilitation of equipment and getting back on stream.

KANSAS CITY, Kans.—What happens when a large refinery operation, with little warning, is flooded with 5 to 15 ft. of water covering most of the refinery property?

After several weeks and with practically all facilities of its local refinery back in operation, the management of Phillips Oil Co., 100 per cent subsidiary of Phillips Petroleum Co., now has the answers to most questions.

The refinery is located in the Fairfax industrial district, which has been greatly expanded since World War II, and the Phillips refinery's neighbors include a number of widely known industrial concerns in addition to the local interests. This district adjoins other industrial sections which were also flooded, with heavy loss of property.

The first concern of the Phillips company was the servicing of jobbers and dealers in this area who are dependent on Phillips products. This included civilian and military users of high-octane aviation gasolines. Fortunately the company was able to resume practically normal deliveries to trucks and tank cars from plant storage before the flood waters had completely receded. Supplies were also available from the company's refineries in Texas and Oklahoma, some being shipped through the company's product line which extends from its Borger, Tex., refinery to St. Louis and Chicago.

Facilities.—The Phillips refinery site covers an area of about 400 acres at the confluence of the Missouri and Kansas rivers. High dikes for many years adequately have protected the industrial area. The refinery operations have been greatly expanded since World War II and it is now rated a complete plant with a crude-oil capacity of 60,000 bbl. daily. It has both thermal and catalytic cracking installations with a total capacity of about 35,000 bbl. daily. The large catalytic unit was placed in operation last year. Since the war a modern lubricating-oil plant was built, including facilities for compounding and packaging finished industrial and motor oils and greases.

Other distillation equipment includes a large unit for processing topped crude to obtain cracking stock and a residue used in the manufacture of asphalt. The refinery has a catalytic polymerization and a large gasoline-vapor-recovery system. A two-story office building was built in 1942. Steam-generation power plants, treating equipment, and several other plant facilities have been enlarged over the past 3 years to take care of the increased needs of the plant.

Practically all of the refinery site was covered with water except most of the crude-oil distillation equip-

(Continued on page 156)

MIDDLE EAST

Waiting Game in Iran

Both sides claim next move is up to the other; Britain counting on internal pressure to soften Iran's attitude

Dahl M. Duff

THE Iranian situation has developed into a waiting game where the principal question is "How long can the Iranian Government hold out lacking oil revenue and facing the prospect of unrest and opposition within the country?"

After suspension of the second effort to negotiate a settlement, both sides say it is up to the other to make the first move.

On his way back to the United States, W. Averell Harriman, President Truman's special representative, aligned himself with the British in sitting back and waiting for developments. Harriman said he approved the eight-point British proposal as a basis for negotiation and asserted that "the next move is up to Iran."

In Teheran, Allahyar Saleh, chairman of the Oil Nationalization Board, said that the initiative for reopening the talks rested with Britain. He contended that the day before the British mission left to return to London, Iran submitted counterproposals to which the Iranians still expect the British to reply.

The counterproposals Saleh referred to were contained in a three-point memorandum submitted by Iran's Premier Mossadegh to Richard R. Stokes, chief British negotiator. This provided: priority for former Iranian oil buyers; individual contracts by Iran with foreign technicians; and study by Iran of British claims for compensation. The memorandum was considered by Stokes before he left Teheran and rejected as a basis for discussion.

Oil discount.—A 20 per cent discount for oil buyers was announced over the week end by Deputy Premier Hassein Fatemi, spokesman for the oil-nationalization commission.

So far, Iran has been unable to sell any of its oil in the face of the refusal of the large international companies to deal with the nationalized industry. The relatively small amounts which it may sell F.O.B. Persian Gulf would be taken as a moral victory, though unlikely to be of much help in relieving Iran's serious financial position.

Fatemi said Iran would sell oil on a cash-and-carry basis to any foreign country. Poland is the first iron-curtain country to show interest. Presumably available for sale are the more than 10,000,000 bbl. of products in storage at Abadan which are normally sold on the basis of Gulf Coast quotations. Prevailing crude price in the Persian Gulf is $1.75 for 36°-gravity oil. With a 20 per cent discount, the price would be $1.40.

Abadan nucleus.—In London, Harriman conferred with the British cabinet. Afterwards, it was authoritatively reported the British would keep the nucleus of about 350 Anglo-Iranian Oil Co., Ltd., staff members at Abadan ready to resume operations when the Iranians agree to some form of British management. No military action is planned unless these British nationals are gravely threatened. As for negotiations, there will be no immediate step on the part of Britain.

Before leaving London, Harriman said he was "naturally disappointed but not discouraged" by the breakoff of negotiations. However, he said a solution is possible and that a cooling-off period may be valuable.

"We must realize that the nationalistic feeling in Iran is very deep-seated," he said. This spirit of nationalism, he added, must be satisfied, but its existence "has made the negotiations difficult."

Rumors dispelled.—Harriman scotched several rumors. He denied that Americans might take over and operate the Iranian oil industry, said he had not quarreled with Stokes over the conduct of the Teheran discussions, and asserted he did not believe the present Iranian Government would attempt to make an oil deal with Soviet Russia. He pointed out that construction of a pipe line to move Iranian oil to Russia would be very costly and difficult.

There is considerable difference of opinion on how long the government can stand up under the inevitable pressure, political as well as financial, that it now faces. Some say indefinitely. Others expect a break within a matter of weeks.

Supply situation.—For the time being, the deficit in world supply resulting from the Iranian shutdown is being met without severe hardship. Harriman has warned Iran that as months go by, it will be increasingly difficult to recapture the oil markets it is losing.

Refinery expansion is being accelerated in Europe as a result of the Iranian loss. It is reported that work on the 80,000-bbl. daily refinery being built by Anglo-Iranian at the Isle of Grain in Kent is being speeded up considerably and that production at an initial rate of about 40,000 bbl. daily will be possible early in 1952.

Iranian relief.—Apparently recognizing the serious social problem certain to result from unemployment of Iranian workers in the Khuzistan oil province, the Iranian Government last week outlined an ambitious plan for public works and other relief in the area. Author of the plan was Hussein Makki, fire-brand secretary of the oil-nationalization board.

Makki told the lower house of the Iranian Parliament that Anglo-Iranian has kept the province in a backward condition to protect its supply of cheap labor. He proposed that 15,000 construction and road workers formerly employed by Anglo-Iranian be used in building houses. Kazem Hassibi, nationalization-board member, said Iran could, by drawing on its fiscal reserves in London, meet the oil-wage bill and other expenses for 6 months, and then if necessary fall back on the projected internal load. In March 1951, Anglo-Iranian employed 70,628 Iranian workers, plus 4,520 non-Iranians.

In Abadan, Abbas Mazda, spokesman for the national oil company, said: "Persia is in a position to hold on for 2 or 3 years with the refineries idle, but I know for a fact that Britain will have exhausted her reserves of aviation spirit by February 1." He said there were enough Persian engineers to run the oil fields and that the Iranian oil workers would "not tolerate foreign bosses, whether they are British, American, or German."

Growing Line

Kirkuk-Banias 30-32-in. system ahead of schedule

THE 30 and 32-in. pipe line now under construction from Kirkuk field in Iraq to a Mediterranean terminal at Banias, Syria, is scheduled to be completed next April, considerably earlier than originally anticipated.

The line is being laid by Bechtel International Corp. for Iraq Petroleum Co., Ltd. It will provide capacity for the movement of 275,000 bbl. daily or more of Iraq crude and allow a major addition to oil production in the Middle East.

Reports are that some 120 miles of the 30 and 32-in. section eastward from near Homs Gap have now been laid. All but about 40 miles of the 26-in. from Banias to near Home Gap

LINING UP.—Native crew is shown here lining up 26-in. pipe in the Beka'a Plain area crossed by the huge I.P.C. Middle East pipe line, now expected to be in operation next April. I.P.C. photograph by A. R. Tanner.

has been laid, and the plan is to start a second gang working westward from Kirkuk as soon as the 26-in. section is fully completed.

It is expected that construction will be at the rate of about 60 miles a month when work is under way from both ends of the 30-32-in. section.

Less than 100 miles of the pipe for the line remains to be shipped, and this is due to leave in the next 2 months. The 30 and 32-in. is coming from the mill of Consolidated Western Steel Co. at Maywood, Calif.

Necessary pumping facilities at Station T-4 also are expected to be ready by the time the line is completed. Existing capacity will be used to Station K-3, the bifurcation point on the present I.P.C. system.

The present I.P.C. Mediterranean system consists of dual 12 and 16-in. lines from Kirkuk, dividing at K-3 with one pair running to Tripoli and the other to Haifa. The Haifa branch has been closed because of the Jewish-Arab differences.

Early completion of the 30 and 32-in. Iraq line is particularly important in view of the prospect of an indefinite shutdown in Iran. Present production in Iraq is limited to about 170,000 bbl. daily, which is the capacity of the existing lines to Tripoli.

The new line will bring this total up to nearly 500,000 bbl. daily, and other Iraq oil is due to be exported early next year from Fao on the Shatt-el-Arab River at the head of the Persian Gulf. This is from fields of Basrah Petroleum Co., Ltd., in the Basrah area.

Iranian Sidelights

Repercussions from nationalization of British petroleum industry in Iran continue to crop out all over the world

REPERCUSSIONS of Iran's action in nationalizing its British-owned petroleum industry continue to crop up around the world. Here are a few of them:

In Germany.—Under the heading, "Count Us Out," the informed Erdol-Informationsdienst in Hamburg, Germany, said: "Reports from Abadan mention 200 German oil experts who are to be employed in responsible positions in the Iranian oil industry to be nationalized. We learn from well-informed sources that no such proposals from Iran have been received by German authorities nor by the oil companies.

"The majority of German oil experts are working on German oil fields and in refineries, and would not think of exchanging their jobs at home for the precarious conditions to be expected in Iran. It may be possible that Persia may enroll the services of some unemployed technicians. A large-scale employment, however, which is only possible with the aid of the federal government or the German oil companies, is out of the question."

Hussein Makki, fire-brand Iranian nationalization leader, told reporters at Abadan some time ago of the offer of technicians from Germany, among other countries. At the time, Makki said one United States company had offered to send 2,000 technicians at once, but he did not name the company.

In America.—The Iranian ambassador recently met in Washington with a deputy assistant secretary of state and asked United States help in obtaining 16,000 tons of lubricants for his country. When Iran nationalized Anglo-Iranian Oil Co., Ltd., it cut off its own supply of lubricating oils. These were not manufactured at Abadan, and Anglo-Iranian formerly supplied domestic needs from imports principally from the United States.

The shortage of lubricants has been seriously hampering Iran's industry and transportation.

When the nationalization law was passed, Anglo-Iranian had almost completed construction of a modern plant at Abadan which would produce lubricating oils for Iran and other areas in the Persian Gulf region.

The plant had been scheduled to go into operation later this year with a capacity of 20,000 tons annually. The furfural-extraction and clay-contacting units had been completed and commissioned; further work was yet to be done on the M.E.K. dewaxing unit. The exodus of personnel out of Abadan brought this project to a standstill.

In Argentina.—The first Western Hemisphere shortage of oil resulting from the Iranian shutdown appears to be shaping up in Argentina. In Buenos Aires, the Argentine Government decreed priorities for the use of industrial fuel oil. Transportation users, power plants, and cement factories were unrestricted. Quotas for other consumers were to be disclosed later.

Argentina, where a state oil organization controls most of the industry, meets 60 per cent or more of its total requirements from imports. Much of this comes from British sources, formerly including Iran, as a result of bilateral trade agreements first signed about 2 years ago.

Earlier in August, Argentina was reported considering a deal with Iran to supply tankers and technicians to assist the nationalized oil operation. Just what Argentina could spare in view of its own requirements was in question.

Anglo-Iranian has an owned and chartered tanker fleet of about 3,700,000 tons. The Argentine fleet totals some 300,000 tons. As for technicians, some oil men feel even the most experienced engineers would have difficulty stepping in and running unaided an operation with the size and complexity of that in Iran.

In India.—In New Delhi, the Indian Government was reported to have

suggested to two British and one American oil company that they construct an oil refinery in the country. The only refinery at present in India is the 5,750-bbl. daily plant of Assam Oil Co., Ltd., which handles the country's small indigenous production.

The proposed new refinery would handle imported crude and would help avert shortages such as the country now faces as a result of the shutdown in Iran. Major companies marketing in India include Standard-Vacuum Oil Co. and the Burmah-Shell organization.

In making its suggestion for the construction of a refinery, the Indian Government was reported to have given assurances that such a refinery would not be nationalized within 30 years after the time it commenced operations.

In Kuwait. — With the shutdown in Iran, Kuwait, the 1,950-sq.-mile shiekhdom at the head of the Persian Gulf, has moved into position as the world's fifth largest oil producing country—ranking behind the United States, Venezuela, Saudi Arabia, and Russia.

During July, Kuwait's output totaled 2,720,501 tons, or an average of 649,410 bbl. daily. June production was 528,500 bbl. daily. Kuwait did not begin commercial production until 1946. The concession is owned 50-50 by Gulf and Anglo-Iranian. As a sterling oil source, it is expected to make up a substantial part of the Iranian deficit. Kuwait provides crude but not refining capacity. The 25,000-bbl.-daily refinery at Kuwait is mainly for bunker and fuel-oil production.

LATIN AMERICA

Tropical Bows Out

De Mares concession, complete with facilities, returned to government, but International to continue exploration

ALTHOUGH International Petroleum Co., Ltd., has returned the De Mares concession to the Colombian Government, it plans to continue exploration in the country on a large scale in other concession areas which it holds.

International's future activities in Colombia were reviewed briefly by L. P. Maier, president, in his speech at Barrancabermeja on the occasion of the August 25 reversion of the De Mares concession.

Maier pointed out that Tropical Oil Co., the International affiliate which has held the concession for more than 30 years, disappears with the expiration of the concession term. The new subsidiary, International Petroleum (Colombia) will supply technical advice and specialists to the Empresa Colombiana de Petroleos, the government company which has taken over De Mares.

Secondly, Maier said, "to manifest the faith it has in the continuing progress of production in De Mares," International Petroleum (Colombia) has agreed to lend Empresa Colombiana $10,000,000 for the enlargement of the refinery at Barrancabermeja. The Empresa and International of Colombia have decided on a contract whereby International will continue to operate the refinery at its present and future capacity.

Significance.—The International president told the Colombians celebrating the concession reversion that the event was of world-wide significance. Maier said that, as far as he knew, the occasion marked the first time in the history of the petroleum industry that an important oil-producing property, developed by private capital under a concession granted by a nation, has been returned by virtue of the expiration of the period of the contract. "And this reversion," he said in an obvious reference to Iran, "has taken place in a manner that might well serve as an example elsewhere."

Because of the efforts carried out by Tropical in De Mares, Maier continued, the Colombian nation receives a concession with proved primary reserves of more than 140,000,000 bbl. and a potential considerably greater. In addition, Colombia receives many other facilities and supplementary installations, including the Barrancebermeja refinery of 25,000 bbl. daily capacity, a railroad, two electric plants, complete shops, camps and housing for employes, a modern industrial hospital, and many other facilities.

Maier said Tropical considered it a privilege to have had the opportunity to work with Colombians "to supply the effort, the capital, and the know-how that ultimately turned this latent (petroleum) wealth into real wealth." He announced that the company was offering a fund of 250,000 pesos ($100,000) to stimulate technical education and especially manual instruction in Colombia. Later, he added, the company will seek the aid of persons or institutions that might assist with the project since it is intended that the fund be administered by Colombians in direct benefit of Colombian workers.

Ceremony.—Actual reversion of the concession occurred at midnight and was marked by horns, whistles, and fireworks at the celebration at Barrancabermeja. More than 500 Colombians representing the military government, church, press, and the oil industry were present. Approximately 100 of these had been brought to the concession area from Bogota in what was said to be the largest civilian airlift ever undertaken in Colombia.

The concession was received on behalf of the Colombian Government by the minister of fomento, Dr. Manuel Carvajal. Other government representatives attending included Luis Emilion Sardi, general manager of the Empresa Colombiana, and members of the National Petroleum Council, Gabriel Cuervo, Juan Jose Turbay, and Jaime Duque. Besides Maier, company officials included J. K. Oldfield, an International director, and E. C. Borrego, general manager of International of Colombia.

The disappearance of Tropical marks the end of one of the oldest and best-known names in the foreign oil business. The marketing operations formerly carried out by Tropical will be taken over by Esso Colombiana, S. A., which was organized more than a year ago. With the reversion, International lost the only production it had in Colombia, but there are about 5,000,000 acres held under concession elsewhere for the continued exploratory program.

Losing Deal

Controls force crude sale at below-cost price in Peru

GOVERNMENT price controls coupled with requirements for the supply of oil to the domestic market are exerting a squeeze play on oil operators in Peru.

This has been again pointed out in the recent annual statement of Lobitos Oilfields, Ltd. Lobitos, through its Peruvian subsidiary, produces about 8,500 bbl. daily of Peru's 42,500 bbl. daily total.

Lord Forres, chairman of the company, told stockholders recently in London that net return is well below the cost of production on the 52 per cent of the company's total crude output which it is obliged to supply for refining for domestic consumption.

"Representations made to the Peruvian Government seeking increased price for refined products continue to be abortive . . ." he said. "The Peruvian Government cannot expect the producing companies to supply the local market at a loss."

The Lobitos chairman mentioned that national consumption of petroleum is rising rapidly in Peru and said that with production more or less stationary, it may not be long before the entire domestic production is re-

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quired for the home market. He added that it is still to be hoped the government will permit products to rise to world levels.

Reviewing company operations, Lord Forres said the company plans to buy compressors and other equipment over the next few years to improve recovery from its fields. The project results from recommendations made by an American reservoir engineer retained by the company to study the matter. The result of the investment, he added, will be higher oil recovery and lower operating costs.

During the year, the chairman reported, the agreement with International Petroleum Co., Ltd., regarding the joint boundary area was terminated, and Lobitos' Peruvian company entered into an arrangement whereby International undertook development of a small area on the boundary belonging to Lobitos. This was considered advantageous since International had idle rigs and crews. Lobitos pays its half of the development costs in crude oil as produced.

Lobitos' Peruvian production for 1950 increased nearly 12 per cent to 381,673 tons, a record high level. Improved drilling and production techniques brought about the increase. The company drilled 163,779 ft. compared with 103,499 ft. the previous year. The two fields operated by Lobitos in Peru are Lobitos and Restin-El Alto, discovered in 1901 and 1904 respectively.

EUROPE

Italian Law Changes Studied

The long-standing controversy in Italy over amendments to the 1927 mining law may come before Parliament in the next few months. The cabinet has approved a new law, but the Po Valley, the most promising section of the country, is placed under control of Ente Nazionale Idrocarburi, a government organization.

Italian Government officials are hopeful that this new organization will be able to negotiate contracts with private companies along the same lines that Petroleos Mexicanos has employed in Mexico.

Apparently the type of deal a private company would get in the Po Valley would be almost entirely the subject of individual negotiations with the ENI. The Standard Oil Co. (N. J.) organization has had small production in the Po Valley for a number of years but has felt the trend toward state monopoly is squeezing it out of the country insofar as exploration and production are concerned.

A different opinion on the workability of the new Italian law was expressed in Rome recently by Harry MacMillan, director of foreign operations for MacMillan Petroleum Co., Los Angeles. The MacMillan company, Gulf, and D'Arcy Exploration Co., Ltd. (Anglo-Iranian) have been given 100,000-hectare exploration areas in Sicily which under its regional autonomy has a separate petroleum law.

MacMillan said the new Italian law should be quite workable for all foreign companies which want to come into Italy and develop areas under reasonable agreements. "When we consider that companies are rearranging their contracts in a number of countries even to the point of almost an even division of money received, it would appear that operating in Italy under sublicensing might not be too exacting," he said.

Shell Building Sulfur Plant

The Shell organization in the United Kingdom is installing a sulfur-recovery plant at its Stanlow refinery in Cheshire which will account for 10,000 tons of elemental sulfur annually.

The company also is erecting an acid plant to convert waste sulfuric acid sludges into fresh acid. This unit is designed to meet the entire acid needs of this refinery from the acid sludges and from 5,000 tons a year of recovered sulfur. For the present, however, in view of the general demand for elemental sulfur, Shell proposes to market all its recovered sulfur and meet its own acid needs with that manufactured outside from less scarce alternative materials.

Alcohol Plants Completed

All isopropyl alcohol plant units of British Petroleum Chemicals, Ltd., a joint subsidiary of Anglo-Iranian Oil Co., Ltd., and Distillers, Ltd., have been completed and production has begun.

The starting material for manufacturing isopropanol will be obtained from the adjoining Grangemouth, Scotland, refinery of Scottish Oils, Ltd., an Anglo-Iranian subsidiary. British Solvents, Ltd., an affiliate of Distillers, hope that it will be possible soon to meet all of Britain's acetone requirements for which users are now limited to 60 per cent of normal consumption.

Foreign Rigs Exceed 600

Well over 600 rigs are now in operation outside the United States when the total running in Germany is considered together with those elsewhere in the non-Communist world.

At the beginning of this year, 103 rigs and 60 core-drilling outfits were operating in Western Germany, and the number presumably has risen somewhat since that time. In June, rigs running in foreign areas outside Western Germany totaled slightly over 500 *(The Oil and Gas Journal, July 19, page 72).*

On these reports, Western Germany thus has more rigs in operation than Venezuela. Although Western Germany produces only about 26,000 bbl. daily, considerable exploration is under way in the country, and many wells yield relatively minor production. For the year 1951, 438 wells and a total of 489,550 m. (about 1,600,000 ft.) are scheduled to be drilled, giving on the basis of rigs operating at the first of the year, an average of about 4.1 wells per rig per year.

The 103 rigs operating in Germany are classed as deep-drilling rigs, a category understood to embrace all equipment except that for core drilling.

International Briefs

The new 7-mile Suez Canal bypass, which will permit two-way traffic through the 104-mile waterway, is to be inaugurated November 1. It will be officially opened by King Farouk of Egypt in whose honor the new canal has been named. With the bypass in use, waiting time at the entrance will be cut considerably, and passage will be speeded. Oil makes up much of the south-north canal movement. Opening of the Tapline curtailed Saudi Arabian shipments but this has been offset by increased movement from Kuwait.

A decision within a month or so is anticipated in the concession arbitration case involving offshore rights along the coast of the Trucial Coast shiekhdom of Abu Dhabi. The question is whether the shiekh could grant International Marine Oil Co., Ltd., (Superior Oil Co. and Central Mining Co. of South Africa) offshore rights in view of the concession already held by Iraq Petroleum Co., Ltd., organization, that is, whether I.P.C.'s existing concession covered this area. British Lord Justice Asquith heard the case in Paris.

Pantepec Oil Co., C.A., has announced completion of two high-gravity oil producers in the El Roble concession, State of Anzoategui, Eastern Venezuela. RPN 27, located in the southwest part of the 18,000-acre concession, was completed for 650-700 bbl. daily from a sand section at about 6,600 ft. The other well, about 7 miles to the east, was placed on regular production of about 650 bbl. daily of 42°-gravity crude.

Royal Dutch - Shell has disclosed that its technicians in the United Kingdom and the Netherlands expect this year to complete 14 sets of seismograph recording instruments for use in foreign oil exploration. The sets, formerly obtained only in the United States, are being made from parts supplied by British manufacturers with a dollar saving this year of about $600,000.

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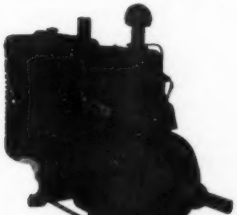

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PERSONALS

Kenney Steps Up

Bayway executive accepts South Africa refining post

BRYANT F. KENNEY, formerly assistant general superintendent of Esso Standard Oil Co.'s Bayway (N. J.) refinery, has been named chairman and managing director of the newly organized Standard-Vacuum Refining Co. of South Africa, Pty., Ltd.

The company which Kenney heads will construct and operate a new 10,000-bbl. daily plant near Durban which will be the first refinery in the Union of South Africa. Kenney is now in Durban where the new company will have its headquarters.

Born in Iowa 41 years ago, Kenney attended schools at Marion, Iowa, and in Chicago before entering Massachusetts Institute of Technology. He received a B.S. degree in mechanical engineering from this institution in 1930 and immediately joined Esso Standard as a student engineer.

Kenney's first job at Bayway was as instrument man on one of the processing units in the refinery. He moved successively into cost-analysis work, general and special processing of petroleum derivatives, and process supervision and coordination.

During the war, he coordinated the receiving, unloading, storage, and transfer of products at Bayway and the associated Bayonne refinery for the U. S. Navy's petroleum pool in the New York area. His 20 years of service in the largest refinery on the East Coast has given him experience in all major phases of the manufacturing end of the industry. He joined Standard-Vacuum in January of this year.

Earl C. Scott, tool pusher for George P. Livermore, Inc., has been transferred from Ringwood, Okla., to Post, Tex.

Thomas A. Egan has been promoted to department head of Esso Standard Oil Co.'s gas house, at the Bayway, N. J., refinery, succeeding **O. T. Lamb,** who has retired.

K. W. Martin has been named manager of Shell Oil Co. of Canada's newly created marine department and in addition, assistant manager of the firm's transportation and supplies department. He was formerly manager of Shell Canadian Tankers Ltd., now merged with Deep Sea Tankers to form the new marine department supervising operations on both Canadian coasts.

Gerald E. Peterson, recent graduate of Miami University, Oxford, Ohio, has joined Shell Oil Co. as geologist at Tyler, Tex.

J. C. Condon has opened a geological consulting office in Wichita. For the past year Condon has been exploration manager for Imperial Petroleum Co. and previously served 4 years in the geological department of Shell Oil Co. in Oklahoma, and 5 years with Anderson-Prichard Oil Corp.

W. B. Hollow has been transferred from the Wichita office of North American Car Corp. to Dallas, where he will direct the firm's Texas oil division. He succeeds the late E. C. Wood.

Howard Bishop Bradley, formerly assistant professor of petroleum engineering at University of Texas, is now a lieutenant in the Navy stationed at the Norfolk Naval Shipyard at Portsmouth, Va., as assistant shop supervisor of the petrochemical department.

Phillip Maverick, petroleum geologist of the Tulsa office of the Securities and Exchange Commission, will leave the commission September 20 to move to Midland, Tex., where he will resume his former work in geological exploration. The Tulsa office will be discontinued on Maverick's departure.

Adolph Sieker, formerly assistant foreman in Magnolia Petroleum Co.'s Chase, Kans., producing district, has been promoted to production foreman and transferred to the firm's Brownfield, Tex., district. Other changes include: **William L. McDonald, Jr.,** petroleum engineer at Morgan City, La., transferred to Kermit, Tex.; **Charles C. Baker,** senior petroleum-engineering assistant at El Dorado, Kans., transferred to Kermit; and **Lee A. Keeling,** formerly petroleum engineer at Kermit, transferred to El Dorado.

James T. Gizady, Jr., assistant superintendent for The Texas Co. at Wichita, has been transferred to Salem, Ill., as superintendent of the Illinois district.

J. F. N. Taylor, of San Francisco, has been retained by Empresa Colombiana de Petroleos, Bogota, Colombia, as consultant in connection with the construction of a new refinery.

Jack L. Scott, Oklahoma City, has accepted a position as petroleum engineer with Phillips Petroleum Co., Caracas, Venezuela, and will be stationed in San Roque field, Anzoategui.

George E. Burpee has been named production manager for Shell Oil Co. in Houston, succeeding **C. P. Bristol,** who has been transferred to Tulsa to take over duties as production manager there. Bristol succeeds **W. H. Burke,** who will assume new administrative duties in the firm's New York office. Burpee, who was formerly production manager at Calgary, Alta., Canada, started with the firm in 1932 as a trainee in the company's Kilgore, Tex., production department. Bristol, a veteran of nearly 20 years with Shell, joined the firm as a rodman in 1931.

GEORGE BURPEE

C. P. BRISTOL

M. G. Grumbine has been transferred from the Odessa, Tex., area of Phillips Petroleum Co., to San Roque field of Phillips Oil Co. in Anzoategui, Venezuela, where he will work as a tool pusher.

Randal Maass, formerly assistant manager of General Petroleum Corp.'s Torrance, Calif., refinery, has joined Standard-Vacuum Petroleum Mij. as assistant manager of the refinery at Palembang, Sumatra.

M. H. Arveson has been elected a director of Indoil Chemical Co., chemical subsidiary of Standard Oil Co. (Ind.). He has been associated with Standard Oil in various technical capacities since 1924.

PERSONALS

Jay Grubb has joined Mene Grande Oil Co., Caracas, Venezuela, as a research analyst in the management-research department. Grubb is a graduate of Iowa State University, where he specialized in industrial engineering.

Dr. Arman E. Becker, consulting engineer and physicist of the research division of Standard Oil Development Co., has retired after 31 years of service. He will continue his hydrocarbon research work.

Edward H. Nadeau, formerly construction engineer at Socony-Vacuum Oil Co., Inc.'s East St. Louis refinery, has been promoted to senior mechanical engineer.

Joseph W. Luckett, Jr., has been transferred from Pure Oil Co.'s Midland, Tex., office to Abilene, Tex., as district geologist. Other changes in the firm's geological staff include: **John L. Brown,** transferred from Big Spring to Midland, Tex.; and **John G. Beard,** Fort Worth, transferred to Midland. **Lawrence H. Bannister** has joined the firm as geologist at Fort Worth, and **Robert E. Glaze** has recently joined the Midland office.

G. A. Carmichael, area production superintendent at Beaumont, Tex., for Gulf Oil Corp., will be transferred to the company's new Zone 1 Texas Gulf Coast production offices as zone superintendent of production. The new offices, located near Pierce Junction oil field, are in the process of completion and it is believed that operations will be started there on October 1. In this connection, Gulf announced the following promotions and transfers: **J. P. Weichert,** Gulf Coast district petroleum engineer, from Houston to Zone 1 as assistant zone superintendent of production (drilling operations); **W. H. LeGrand,** assistant area production superintendent, from Beaumont to Zone 1 as assistant zone superintendent of production (production operations); **S. H. Miller,** production and proration engineer, Gulf Coast district, from Houston to Zone 1 as zone petroleum engineer; **Hardy H. Head,** assistant area production superintendent at Beaumont, promoted to area production superintendent; **Karl Carter,** assistant area production superintendent at Pierce Junction, transferred to Luling, Tex., as area production superintendent; **P. C. Henry,** area production superintendent at Luling, transferred to the Pierce Junction area as assistant production superintendent; **Fred Sherron,** field foreman, from Goose Creek, Tex., to Beaumont as assistant area production superintendent; **Tom Slack,** area petroleum engineer, from Hull, Tex., to Goose Creek as field foreman; **O. G. Gage,** area petroleum engineer, from Buras, La., to Zone 1 as petroleum engineer; **Randolph Bryant, Jr.,** area petroleum engineer, from Beaumont to Zone 1 as petroleum engineer (production); **J. D. Driskell, Jr.,** petroleum engineer, from Fannett field, Texas, to Beaumont as area petroleum engineer; **J. H. Russell, Jr.,** petroleum engineer at Pierce Junction, promoted to area petroleum engineer; **J. G. Ferrell,** assistant area petroleum engineer, at Buras, Tex., promoted to area petroleum engineer; **R. A. Kilsdonk,** petroleum engineer, from Kilgore to Hull, Tex., as area petroleum engineer; **V. D. Stone,** petroleum engineer at Buras, Tex., promoted to assistant area petroleum engineer; **D. D. Dawson, Jr.,** petroleum engineer (drilling fluids), from Houston to Zone 1 in a similar capacity; **R. F. Thomas,** petroleum engineer, from Fannett, Tex., to Houston as petroleum engineer (production and proration); **E. E. Johnson,** zone superintendent of warehouses at Harvey, La., to Pierce Junction as zone superintendent of warehouses; **A. B. Powers,** zone field-material supervisor at Harvey, promoted to zone superintendent of warehouses; and **John C. Wick, Jr.,** senior clerk at Harvey, promoted to assistant zone superintendent of warehouses.

O. O. Morgan, district chief gager for Shell Pipe Line Co., has been transferred from Penwell to Kermit, Tex.

C. C. Denny has been appointed division development geologist for the western division of The California Co. at Denver.

L. C. Brown has been appointed assistant manager of manufacturing for British American Oil Co., Ltd., Toronto.

John F. Dodge, formerly associated with International Petroleum Consultants, Ltd., Pasadena, Calif., recently resigned to establish offices as a consulting petroleum engineer in Los Angeles.

David Handke, formerly senior engineer in the technical-service division for Standard Oil Co. (Ohio), has been promoted to process engineer at the firm's No. 1 refinery at Cleveland.

F. M. Ricks, Fort Worth, has been elected vice president and exploration manager of Saltmount Oil Co. Ricks, former geologist and assistant to the president of Southland Royalty

IN THE FIELD.—Geology society officials are shown here during a stop on a field trip in the recent sixth annual field conference of the Wyoming Geological Association held in South-Central Wyoming. Standing, left to right, are Lewis G. Weeks, vice president of the American Association of Petroleum Geologists; W. C. Krumbein, president of the Society of Economic Paleontologists and Mineralogists; and Frank A. Morgan, president of the A.A.P.G. Kneeling are: R. W. Mallory, field trip chairman, and J. R. Fanshawe, president of the Wyoming Geological Association.

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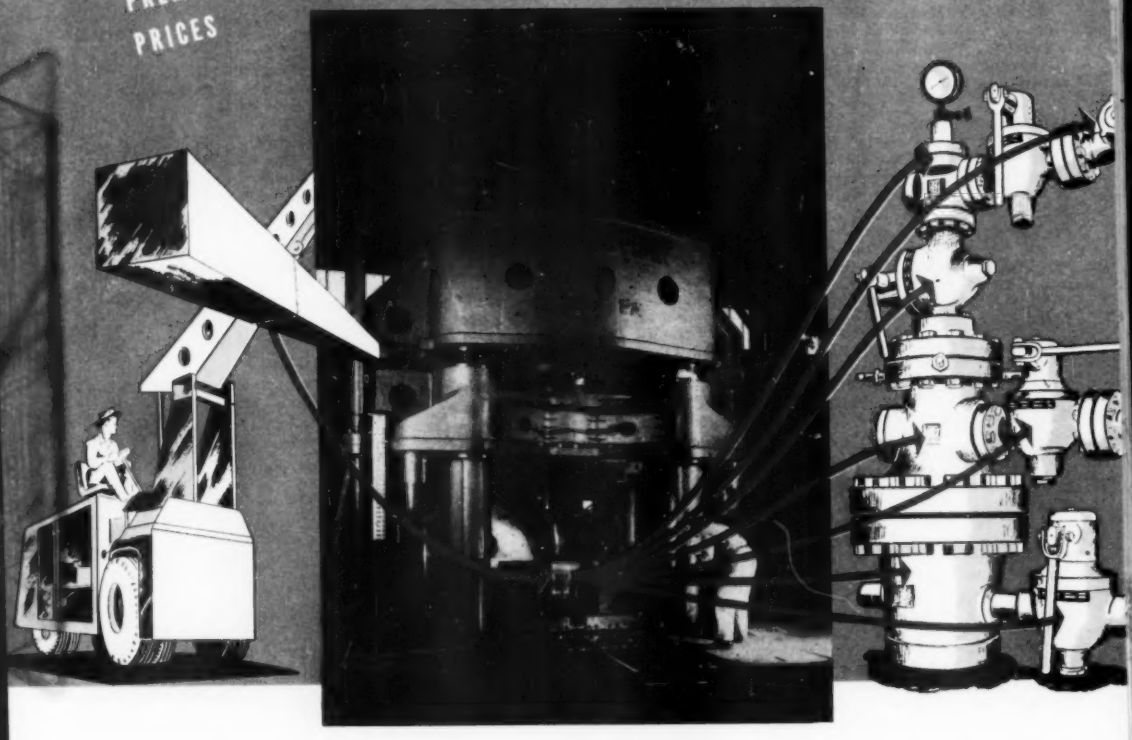

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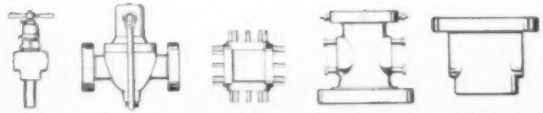

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PERSONALS

Co., will be in charge of all exploration and production activities of the Denver firm, and will headquarter at Fort Worth. Offices were moved there from San Antonio.

Wilson B. Swan, petroleum engineer for Humble Oil & Refining Co., has been transferred from Talco to Pickton, Tex.

W. C. Guess, party chief in charge of the Gulf of Mexico operations for Sun Oil Co., has been transferred from Lockport, La., to Beaumont, Tex., as seismograph field supervisor.

Don Baremore, tool pusher for Sharp Drilling Co., has been transferred from Big Spring, Tex., to Farmington, N. M., and promoted to drilling superintendent.

George E. Crosby, petroleum engineer for Continental Oil Co. at Hobbs, N. M., has been transferred to Rincon, Tex., and promoted to district engineer.

Gilbert W. Evans has been elected president of the new Basin Oil Corp. at Evansville, Ind. Other officers of the new firm include: **Paul H. Farmer,** vice president and geologist; **Louie K. Hamilton,** secretary - treasurer; and **Lawrence T. Verner,** of Dallas, and **Arthur A. Spearin,** of Newburg, Ind., directors.

H. R. Burkhart, mechanical engineer for Shell Oil Co. at New Orleans, has been transferred to Franklin, La., as division mechanical engineer. Other changes and transfers include: **H. W. Barnes,** exploitation engineer, from Franklin to the Delta district in South Louisiana; **R. R. Brown,** division mechanical engineer at Franklin, promoted to division production superintendent; **S. W. Clark,** exploitation engineer, from the Delta district to New Orleans as reservoir engineer; **C. E. Dewitt,** exploitation engineer, from Franklin to New Orleans; **H. L. Franklin,** exploitation engineer, from New Orleans to Franklin; **M. S. French,** junior exploitation engineer, Houston, to Franklin as exploitation engineer; **R. A. Generes,** exploitation engineer, from Houston to Franklin; **O. D. Hutto,** exploitation engineer at Lake Charles, promoted to division reservoir engineer; **J. E. Orrell,** mechanical engineer, from Houston to New Orleans as chief mechanical engineer; **D. D. Paynter,** exploitation engineer, from the Delta district to Donaldsonville, La.; **R. L. Sprague,** reservoir engineer, from New Orleans to Franklin; **H. M. Standley,** exploitation engineer, from Lake Charles to the Delta district; and **C. A. Stuart,** exploitation engineer, from Donaldsonville to Lake Charles as production geologist.

Lamar Lunt, petroleum - engineer consultant, has moved his offices from Midland, Tex., to Santa Fe, N. M.

Clyde T. Dando has been appointed manager of the Millersburg division of Ohio Gas Co. at Millersburg, Ohio. He succeeds **William G. Close,** formerly division manager, who has been retired from active duty, but who will continue his connection with the firm as production consultant.

William Kaplan has been appointed director of the automotive-research laboratory for Pan American Refining Corp. at Baltimore.

W. B. Brinnon, seismic-party chief for Magnolia Petroleum Co. at Portales, N. M., has joined Skelly Oil Co. at Tulsa as geophysical supervisor.

Joseph J. Lawnick, exploitation engineer for Shell Oil Co., has been transferred from Franklin to Lake Charles, La.

Arnold Stebinger, general manager for the Syria-Lebanon area of the foreign-trade department of Socony-Vacuum Oil Co., Inc., will be transferred to London where, effective October 1, he will become assistant to **Charles F. Darlington,** chairman of the board of Standard Fuel Oil Co., Ltd.

R. B. McLaughlin, gasoline-plant superintendent for Northern Natural Gas Co. at Sublette, Kans., has assumed his new duties as process engineer, a newly established position. **Otto Barbee,** who has been assistant superintendent at the Sublette gasoline plant since 1947, was promoted to superintendent.

J. W. Barber, superintendent of Phillips Chemical Co.'s Philblack plants at Borger, Tex., has been named rubber-service engineer. Barber recently returned from an extended assignment in England, in connection with the start-up of operations of the Philblack, Ltd., plant. **A. J. Head,** who has been acting superintendent during Barber's absence, succeeds him as superintendent of the plants. **Austin Morgan,** services superintendent at the Plains plant at Borger, will be assigned to the newly created position of assistant chief mechanical engineer, located in Bartlesville, Okla. **H. H. Stoelzle,** acting mechanical and maintenance superintendent at Plains, will succeed Morgan as services superintendent. **M. L. Studebaker,** consulting chemical engineer in the process-engineering division, will be assigned to the Philblack sales division as technical service engineer with headquarters in Akron, Ohio.

C. W. Armstrong, Jr., district petroleum engineer for Humble Oil & Refining Co., has been transferred from Los Angeles to Lolita, Tex., in the same capacity.

Hugh B. Barton, district petroleum engineer for Humble Oil & Refining Co., has been transferred from the Friendswood district, Genoa, Tex., to Los Angeles in the same capacity.

C. M. Boles has been named superintendent of Phillips Petroleum Co.'s new Big Spring, Tex., district. **C. A. Benson** has been appointed assistant superintendent, and **R. T. Mason** will be the district chief clerk. This district was formed from a portion of the area formerly operated as the Big Spring district with headquarters at Odessa, Tex.

Dr. John V. Starr has been appointed assistant manager of the lubricants and specialities division of the manufacturing division of Esso Standard Oil Co. Technical assistant to the general manager of East Coast manufacturing operations at the Bayway, N. J., refinery since 1946, he has also served as acting manager of the Everett, Mass., refinery.

DEATHS

Jess M. Hester, 73, pioneer rig builder who helped develop Spindletop field, died August 29 at Humble, Tex.

D. R. Thompson, 70, pioneer oilfield worker, died August 27 at Livingston, Tex. He was one of the first drillers in Humble field.

S. M. Carson, 63, Oklahoma and Kentucky oil operator, died at Henderson, Ky., September 1. He started his career as a roustabout in Glenpool field, and later worked as a lease buyer for Carter Oil Co. before going to Kentucky as an independent oil operator in 1937.

John Dacre Munton, 55, manager of the communications department of Atlantic Refining Co., died August 31 in Philadelphia. He had been with the firm since 1926.

John S. Rowe, 67, veteran employe of Mid-Continent Petroleum Corp. and its predecessor, the old Cosden Oil Co., died in Tulsa September 1.

Walter R. Wheat, 82, California oil financier, died August 26 in Mariposa, Calif.

Henry Gore, pioneer Kansas oil man, died August 24 at Wichita. He had been active in Kansas oil development since 1916.

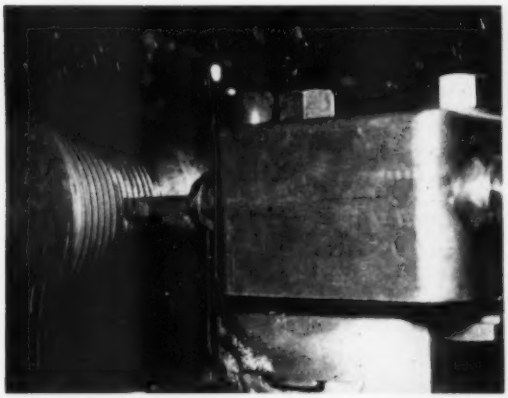

Fig. 1—Setup for peening pin end of a drill collar. Chucked in a lathe, the collar is slowly rotated during operation. Peening of the thread roots is accomplished with a tool powered by a pneumatic hammer. Carried in a special holder the peening tool moves along threads at desired rate since its movement is controlled by feed mechanism of the lathe.

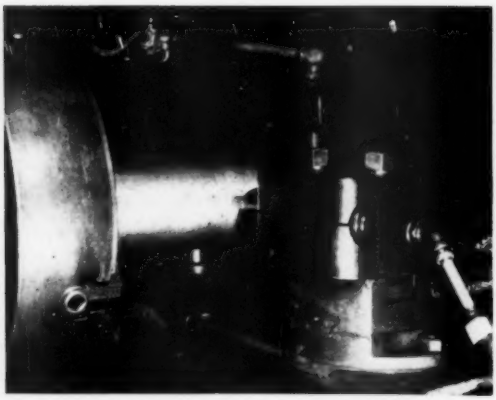

Fig. 2—Brinell ball-fitted tool and a rotating test cylinder are used for calculating power and speed of hammer blows. Test piece is rotated at high speed with coarse feed rate while tool is operated by pneumatic hammer to provide series of indentations in test piece. Distance between and diameter of indentations are basis for calculation.

PEENING PROCESS Increases Fatigue Life of Drill Collars

by George J. Gilbert*

New process reduces tensile strength found in the surface of the thread roots by placing the surface fibers at the root threads in compression. Fibers beneath surface fibers take a greater share of load

A NEW treatment, which involves mechanical peening with an air hammer, has substantially increased the fatigue life of drill-collar connections. Drill collars treated by this process, which is called "Hi-Flex"† by its originators, have now been field tested for over 2 years.

*Assistant chief engineer, Reed Roller Bit Co. †Trade mark, Reed Roller Bit Co.

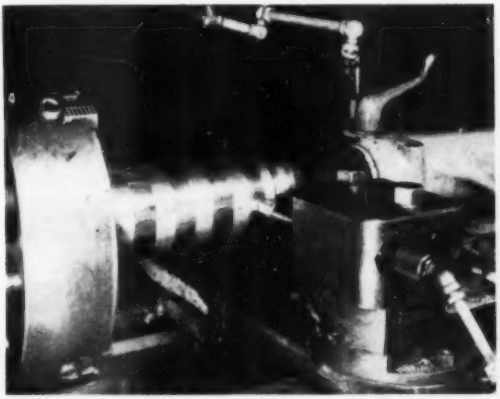

Fig. 3—To determine compressive stresses induced by various peening procedures, cylindrical test pieces were employed. Peening was applied to cylinder in series of bands 1-in. wide. A notch was machined under each band on the inside diameter of cylinder and bands were cut off. Then each was checked with the strain gage shown in Fig. 5.

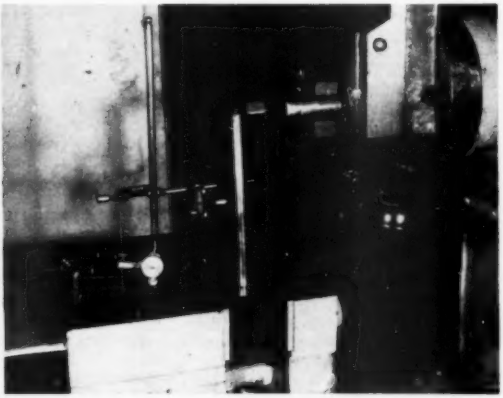

Fig. 4—In another test, bars, set up for cantilever loading, were stressed with repeated loadings supplied by the laboratory's shaper. Investigation showed failure occurred at an average of 108,000 cycles for bars which were not peened. Peened bars did not fail when subjected to repeated loadings of 2,160,000 cycles. As in other tests, Hi-Flex was employed.

Fig. 5—Strain gages were attached to test rings prepared as outlined in Fig. 3. With gage across peened area of ring, a zero reading was obtained. A section was then cut out of ring and second reading obtained. Induced peening stresses were calculated from difference in readings. By machining deeper the notch in the ring, depth effected by Hi-Flexing was found to be 0.020 to 0.030 in.

Fig. 6—For another test, bars were set up for cantilever loading while they were being rotated. Loadings for tests were continuous. An arbor-type mounting secured fixed end of cantilever. Free end of bar was fitted with a bearing to which was attached the loading weight. Stresses from 60,000 to 85,000 psi. were developed. This test showed peening method increased fatigue life two or three times over unpeened bars.

Threaded ends of drill collars have in recent years been the Achilles' heel of the drill string. The use of long strings of drill collars for extremely heavy drilling weights in recent years has aggravated the problem of drill collar breakage at the threaded connection. For this reason, an investigation was started regarding the possibility of placing the skin of the drill-collar thread roots in compression as a means of increasing the endurance limit. Two of the most common techniques used in industry today to obtain skin compression of highly stressed parts are shot peening and rolling.

Before describing the new process, it would be well to review quickly the conditions that result in the breakage of drill collars at the threaded ends and the principles by which placing this skin in compression will increase endurance life.

Unlike drill pipe, a drill collar has extremely heavy walls to supply the necessary weight. As a result, it is quite rigid and major stress that results from any bending or whipping of the drill collar is concentrated at the threaded ends. In the case of drill pipe, on the other hand, the most rigid part of the drill string is the connections. Any flexing is easily taken in the central part of the drill pipe and stresses at the threaded connections remain relatively low.

To give an idea of the severity of the problem, a study of the service given by a large number of drill-collar connections indicated that under severe drilling conditions stresses at the thread roots will often closely approach the elastic limit of the steel used—and this stress is reversed at every revolution of the drill string.

The new process substantially reduces the tensile stress found in the surface of the thread roots by placing the surface fibers at the thread roots in compression. This means that the fibers beneath the surface fibers are forced to take a greater share of the tensile load, thereby reducing the surface stresses to the value that results in their having a greater endurance life.

In developing Hi-Flex two extremely difficult basic requirements had to be met. First, the process had to place the skin in **considerable** compression in a predetermined amount, and second, it had to be effective at the critical point of the threaded connection, namely the thread root.

Origin of Basic Idea

The basic idea of Hi-Flexing was originated by a laboratory technician, A. A. Anthony, of the Reed engineering department. He had the idea of using a pneumatic hammer with a special tool to peen the thread roots. The tool was calibrated according to the method shown in Fig. 2, and a series of tests was instituted.

A series of test cylinders were made according to the procedures shown in Figs. 3, 4, and 5. Various rates of feed, rotational speeds, hammer shapes, and air pressures were used. Test rings were then cut out of the cylinders and the skin compression and depth were measured by means of a strain indicator.

The next step was to Hi-Flex test samples which were then subjected to laboratory tests as shown in Figs. 4, 6, and 7. The test shown in Fig. 4 indicated that the smooth section that had been treated showed an increase in fatigue life of more than 20 times as compared to an untreated specimen. Tests of notched samples subjected to rotational stresses as shown in Fig. 7 produced an increase in

(Continued on page 106)

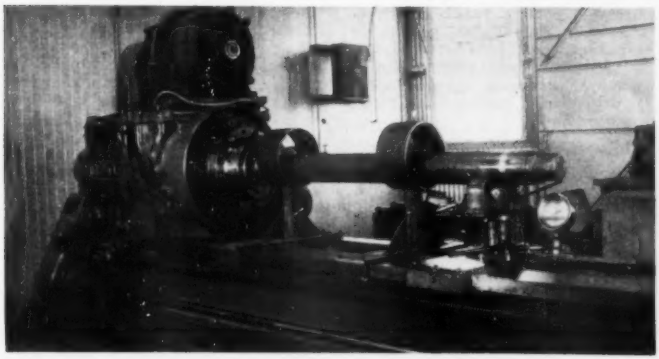

Fig. 7—Equipment shown here is arranged for fatigue testing 3½-in. drill collar threads. Test findings correlated closely with results observed in the field.

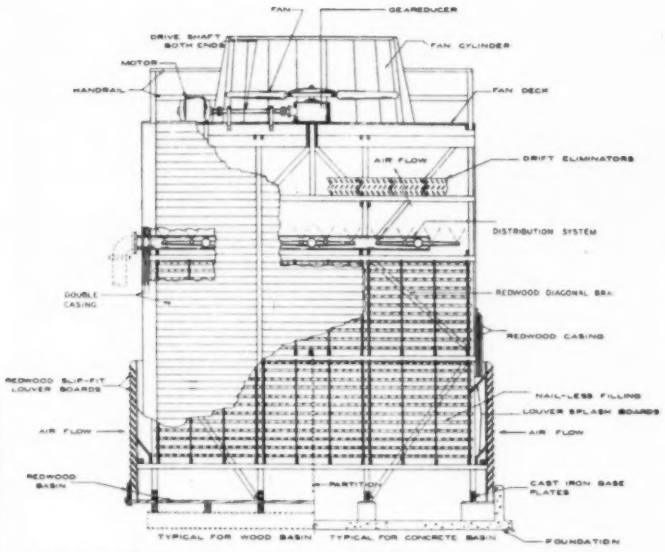

Fig. 1—Sectionalized drawing of induced-draft counterflow water-cooling tower.

Selection, Operation, and Maintenance of Cooling Towers and Air-Cooled Exchangers

by H. E. Degler*

There is plenty of water, at a price! Since the past decade's doubled demand for water, underground sources in many areas have become dangerously depleted by overuse. Consequently, an adequate supply of water has become an increasingly important item in the selection of a new plant location.

Many industries require huge quantities of water. Some specific examples are:

Product—	Lb. of water lb. of product
Oil refining	500
Butadiene	1,200
Rubber (synthetic G.R.-S)	2,500
Ammonium sulfate	700
Steel	250

Once-through use of cooling water is wasteful. In many applications the same water can be used for additional service and/or continuous reuse. Selection of the most economical water-cooling method becomes more important as power demands increase and industries expand their water usage.

DURING the past 40 years the progressive improvement of methods for cooling and subsequent reuse of water have been utilized in the following sequence: (1) rivers, lakes, wells, and cooling ponds, (2) spray ponds, (3) evaporative condensers, (4) natural-draft water-cooling towers, (5) forced-draft cooling towers, (6) induced-draft cooling towers, and (7) dry-surface coolers (air-cooled exchangers).

Progress of the cooling-equipment industry is apparent when it is realized that for a definite need, a modern cooling unit requires only 1 sq. ft. of ground area as compared to 50 sq. ft. for the spray pond and about 1,000 sq. ft. for a natural cooling lake or pond. The continuous demand for a more compact design, better construction, lower cost, larger capacity, greater flexibility of operation, independence of atmospheric uncertainties, and improved all-around performance has resulted in the modern induced-draft water-cooling tower.

*Technical Director, Marley Co., Kansas City. Paper presented at A.S.M.E. meeting, Atlanta.

Principles of Evaporative Cooling

A water-cooling tower is an enclosed structure for the evaporative cooling of water by contact with moving air. (Figs. 1 and 2). Water, when cooled by the evaporative effect in a cooling tower, transfers to the air about 1,000 B.t.u. per lb. of water evaporated. In other words, 100 lb. of water can be cooled 10° F. by the evaporation of 1 lb. of water. Air, absorbing heat from water in this manner, is capable of cooling water below the atmospheric (dry-bulb) temperature; the process is adiabatic, proceeding at constant enthalpy.

Approach temperature.—Theoretically, water may be cooled by the evaporative method (as in a cooling tower) until its temperature is lowered to the air's **wet-bulb** temperature. In practice, however, water is cooled to a temperature approaching the wet-bulb; the closer this "approach" the larger the size of the cooling equipment required for a given duty. Generally used wet-bulb design temperatures are 70° to 80° F., depending upon the service and geographical location of the unit.

"Cooling range" is the number of degrees Fahrenheit that the water is cooled with water-cooling equipment. It is the difference between the temperature of the hot water coming to the cooling tower and temperature of the cold water leaving the tower.

Types of towers.—A "conventional" induced-draft cooling tower is an enclosed structure for the evaporative cooling of water by contact with the air, consisting of one or more individual adjacent cells, each with its own induced air-circulation fan, gear and motor drive mounted on the top of the tower structure. Wood filling is used generally (spray filled for some applications) to provide wetted cooling surface and water breakup. In many cases, a combination of the spray-filled and wood-filled design is used, as shown in Fig. 1.

Another induced-draft tower, developed for the purpose of obtaining more compactness, better construction, lower cost, larger capacity, increased flexibility, and improved performance, is the crossflow type (also called double-flow), Fig. 2. This tower employes multiple fans (adjustable-pitch blades) centered along the top, each fan drawing air through two cells paired to the plenum chamber which is partitioned midway beneath each fan and fitted with "drift eliminators" that also turn the air upward toward the fan outlet. This tower obtains a horizontal air movement as water falls in a cascade of small drops over the wood filling and across the air stream with low resistance to the air flow. The air travel is longer than with the conventional counterflow design shown in Fig. 1.

Selection of Cooling Equipment

Because of the many variables in water-cooling tower calculations and performance, it is difficult to provide simple handbook equations and tables whereby an engineer can readily select the type and size of unit for a definite water-cooling requirement. (Unreliable estimates are frequently based upon L/G, liquid to gas ratio, gallons per minute per square foot plan area, horsepower per 100 g.p.m. water, weight of tower per gallons per minute of water, cooling efficiency, etc.). Each manufacturer has a semiconfidential method of sizing a tower, based largely upon research and actual performance correlated with definite requirements. Selection of cooling equipment for any specified service must ultimately depend upon over-all considerations established from reliable design and performance data.

Cooling towers.—The performance of a cooling tower is improved by increasing the amount of filling, height, area, and/or air quantity. Increasing the tower height increases the length of time the air is in contact with the water, without seriously affecting the fan power required but requires greater pumping power. Increasing the tower area while maintaining constant fan power increases the air quantity somewhat and also the time that this air is in contact with the water because of lower velocity. The surface area of water in contact with the air is increased in both cases.

Increasing the air velocity through the tower decreases the time the air is in contact with the water, but since a greater quantity is passing through, the average differential between the water temperature and wet-bulb temperature of the air is increased, and this increases the rate of heat transfer. Increased air quantities are obtained only at the expense of increased fan power, which goes up approximately as the cube of the air quantity. Air velocities through induced draft towers vary from 250 to 400 ft. per minute over the gross area of the structure; pumping heads vary from 12 to 30 ft., depending upon the design.

TABLE 1—CHARACTERISTICS AND COSTS OF WATER-COOLING TOWERS—1925 TO 1950
(95° F. hot water—85° F. cold water—75° F. wet bulb)

Capacity—	5,000 g.p.m. (3,000 kw.)				20,000 g.p.m. (12,500 kw.)			
Years	1925	1932	1941	1950	1925	1932	1941	1950
Base, ft.	22 x 95	30 x 72	30 x 80	36 x 36	36 x 220	26 x 240	40 x 240	60 x 60
Height, ft.	40	36	26	20	40	36	26	26
Area, sq. ft.	2,112	2,160	2,400	1,000	8,420	8,640	9,600	3,600
Fans:								
Number	6	6	4	2	22	24	10	2
Size, dia., ft.	11	11	13	12	12	11	16	22
B.h.p., each	28.4	19.2	24	25	30	19.2	38.4	70
B.h.p., total	170.4	114.9	96	50	660	460.8	384.0	140
Weight, dry, lb.	280,000	260,000	240,000	90,000	960,000	940,000	900,000	290,000
Pump head, ft.	27	27	20	14	28	28	20	26
Total cost	$22,000	$20,000	$19,000	*$18,500	$78,000	$71,000	$67,000	*$62,000
Cost per kw.	$7.30	$6.70	$6.30	$6.17	$6.30	$5.70	$5.40	$4.95

*1943-45 costs were 60 per cent of these amounts.

Table 1 presents the characteristics and costs of two representative sizes of water-cooling towers for the years 1925, 1932, 1941, and 1950; careful study will indicate that improved designs have continuously reduced costs during this 25-year period, despite the recent inflationary period. Even greater reductions have been made in fan horsepower, number of fans required, and the water pumping heads required, with improved performance and flexibility. Space requirements are less, appearance is better, drift loss has been practically eliminated, and structural details have been simplified and improved, with resultant lower maintenance and greater safety. The increased costs of labor and materials for modern water-cooling towers have been offset by better engineering as reflected by continued improvement, simplification, and closer adaptation to the specific requirements of each application, and development of every opportunity for wise reductions in the cost of production and operation.

Air-cooled exchangers. — The air-cooled exchanger is a device for cooling or condensing fluids by circulation of the fluid through finned tubes and forcing of atmospheric air across the coil sections. This dry-surface cooler is basically a noncontact convection-type heat exchanger. One arrangement for a dry-cooler is the induced-draft unit (Fig. 3) with the fan mounted on top discharging the air upward and inducing air across a horizontal bank of coils mounted below the fan. Another arrangement is the forced-draft (Fig. 4) with the fan discharging air upward across a horizontal bank of coils mounted above the fan. Small portable units are conventionally arranged with a vertical coil bank mounted to receive a horizontal stream of air across the coil.

The air-cooled exchanger may be used in preference to a water-cooling tower for applications of "high level heat removal" where temperatures of the fluids to be cooled are above 140° F., and where water is scarce, expensive, and/or badly polluted, or where the portable features are desirable. Normally a cooling tower is more economical, but the cost of the air-cooled exchanger decreases relative to that of the tower as the temperature of the fluid-to-be-cooled rises. Both units have their own applications and in some instances either type may be used. However, a careful evaluation of both methods should be made to insure that the most suitable cooling equipment is selected in each case.

The following list shows typical applications in the oil and gas industry for finned tube air-cooled units:

Liquid cooling. — (a) Engine jacket water, (b) engine lube oil, (c) absorption oil, (d) stabilized crude, (e) quenching oil, (f) amine solutions.

Gas cooling. — (a) Natural-gas intercooler, (b) natural-

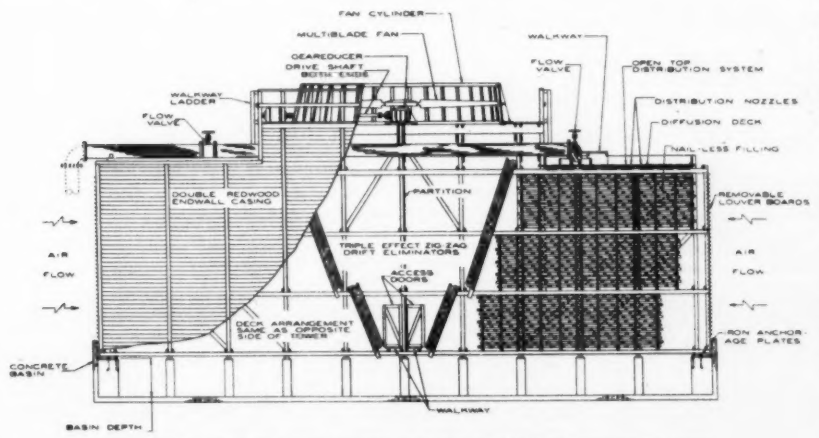

Fig. 2—Section through a large-capacity cross-flow (double-flow) water-cooling tower.

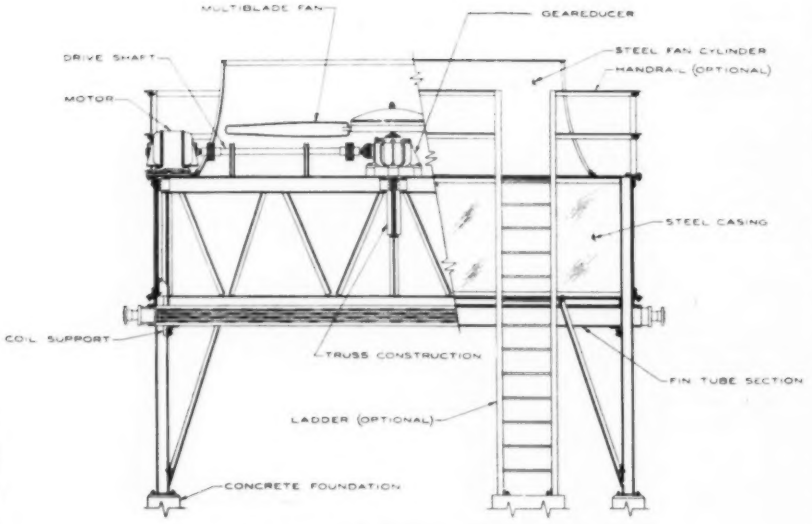

Fig. 3—Dry surface unit arranged for induced-draft cooling.

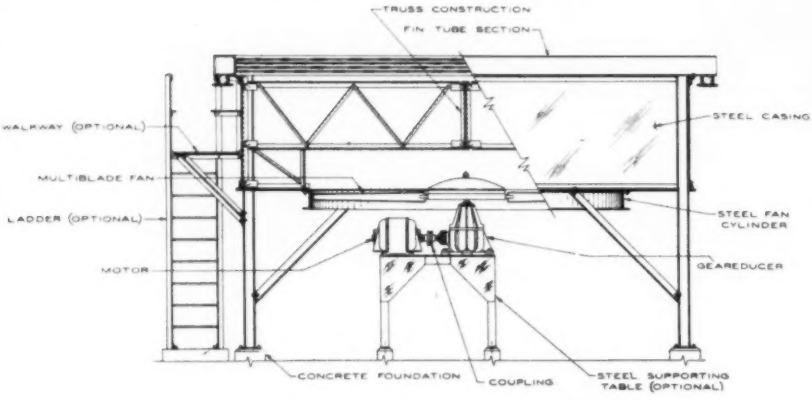

Fig. 4—Forced-draft arrangement for dry surface-cooling unit.

gas aftercooler, (c) high-pressure gas (pressure-booster station).

Vapor cooling. — (a) Gasoline, (b) steam, (c) still reflux, (d) still overhead, (e) debutanizer, (f) depropanizer.

The place of dry-surface air-cooled heat-transfer equipment in industry should be one of increasing acceptance and usage. The basic reason for this prediction is that in spite of developments to conserve the use of water, to increase the availability, and to more conveniently dispose of the heated water, all of these efforts will increase cooling costs. Hence the use of dry-surface coolers will become increasingly attractive, and more applications will be considered and made.

A process industry found it necessary to provide an additional cooling of 25,000,000 B.t.u. per hour and could have provided additional water only at great expense because of limitations of present size of water mains and pumps. Additional heat-exchange equipment also was needed, further complicating installation problems. An air-cooled exchanger was installed; because of the self-contained feature of this type of cooler, no modifications of the utility system were required beyond the electrical connection for the fan-drive motors. A need was evidenced to handle a cooling load existing only during winter weather. The dry-surface cooler was preferred because of small space requirements, low air temperature, simplicity in starting, and easy control of the freezing hazard.

When selecting the design air temperature for dry-surface coolers, it is generally acceptable to choose a dry-bulb temperature which will not be exceeded more than 5 per cent of the hours between noon and midnight during the months of June to September, inclusive. The temperatures that occur in excess of this design value will be of such short duration as not to have an appreciable effect on efficiency of performance. Frequently used dry-bulb design temperatures are 95° to 100° F.

Evaluation of Costs

A comparison of costs for various types of cooling equipment for a given application requires detailed study. To obtain an estimate, a complete analysis must be made; first cost, power costs, water costs, maintenance, etc., can be evaluated over the life expectancy of the equipment. The calculation may be made as follows:

Annual operating costs = maintenance + depreciation + power costs.

$$A = M + C/t + P$$

where

A = annual operating costs.

M = maintenance, insurance, taxes, etc., figure furnished by purchaser.

C = cost of equipment, would include any or all of the following: (1) Cost of unit erected, by manufacturer; (2) pumps, piping, etc., by purchaser; (3) electrical work, by purchaser.

t = time in years, estimated life of equipment.

P = annual power costs for fans and pump (or pumps).

Example.—A 900-b.hp., 300-r.p.m., two-cycle, solid-injection, pump-scavenged, diesel engine in Ohio is to be cooled with recirculated water. Make necessary estimates and select cooling equipment required. Prepare an evaluation showing cooling tower and air-cooled exchanger costs upon a basis of operation at full fan speed

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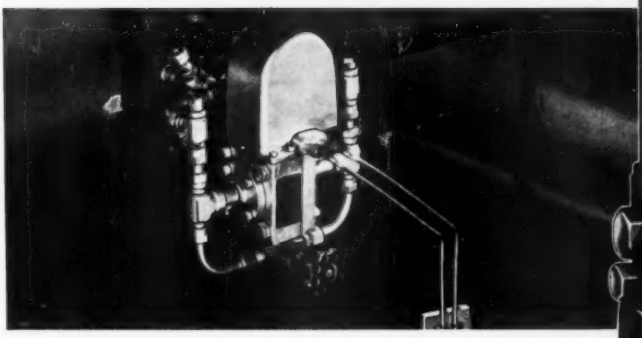

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Calculation. — The cooling system for this type diesel engine absorbs about 2,500 B.t.u. per b.hp.-hr. Assume a shell-and-tube exchanger (with cooling tower) designed to cool jacket water from 170° to 158° F., and that the raw-water temperatures are to be 115° and 95° F. to a 72° F. design wet-bulb air temperature.

Heat to water = 900 b.hp. × 2,500 B.t.u. = 2,250,000 B.t.u. per hour.

$$\text{G.p.m.} = \frac{2{,}250{,}000}{60 \times 8.33 \times 20^\circ} = 225 \text{ g.p.m.}$$

raw water circulated through tower

$$\text{G.p.m.} = 225 \times \frac{115^\circ - 95^\circ}{170^\circ - 158^\circ} = 385$$

g.p.m. soft water through engine jacket

Power cost = $0.015 × 24 × 30 × 8 = $86.40 per kw. per year.

TABLE 2

Evaluation Costs of Cooling Tower and Air-Cooled Exchanger for Same Cooling Requirements

(900-b.hp. diesel engine—375 g.p.m. soft water)

	Cooling tower	Air-cooled exchanger
Cooling tower and basin	$1,200	
Shell-and-tube heat exchanger	950	
Pump (raw water) with motor	250	
Air-cooled exchanger		$2,900
Piping and soft-water pump	400	400
Electrical work	350	300
Cost of equipment, "C"	$3,750	$3,600
Maintenance (5% and 3%)	$190	$110
Water and treatment cost	350	30
Insurance at 2%	75	72
Taxes at 1%	38	36
Contingencies at 2%	75	72
Maintenance, "M"	$728	$329
Fan horsepower	5	10
Pump horsepower	3	2
Kilowatts = Hp. × 0.746 / 0.88 motor eff.	6.8	10.2
Power costs at $86.40 per kw.-yr., "P"	$587	$880
Annual operating cost, A = M + C/20 + P	$1,503	$1,380

Operation and Maintenance

Pages of recommendations could be written on the starting up, operating, maintaining and shutting down of cooling equipment in order to obtain maximum results under varying load requirements and changing weather conditions. The life of any piece of cooling equipment is directly dependent upon its inherent qualities, type of service, severity of operation, general care and maintenance, and climatic environment. The continued utility of all mechanical equipment depends primarily upon maintenance.

For best operating results it is essential that the hot-water distribution system, the tower fill, and the cold-water collecting basin be kept clean of leaves, dirt, algae, scale, etc.; and also that a uniform rate of water flow through the tower be maintained.

Water treatment.—Treatment of cooling tower water includes: prevention of corrosion and scale formation on heat-exchanger equipment; prevention and control of algae; and control of delignification of cooling-tower lumber. (Delignification is defined as the chemical deterioration of lumber caused by the removal of the lignin binder between the wood fibers; in cooling-tower lumber, delignification is generally caused by the combining of sodium carbonate from the water with the lignin and cellulose fibers of the wood.)

The amount of makeup water required depends upon evaporation loss, drift loss, and blowdown. Evaporation losses average 0.80 per cent of the water circulated for each 10° F. cooling range. Drift loss is the water carried away by the air current in the form of droplets or mist. This loss seldom exceeds 0.1 per cent (of the water circulated) in properly designed induced-draft towers.

The amount of blowdown used depends upon the hardness of the circulating water, the type of water softener or inhibitor used, and the amount of drift loss. Blowdown is normally controlled to maintain the concentration of dissolved and scale-forming solids below the point where the formation of scale would occur or would cause corrosion.

Some scale-forming materials are found in practically all water; however, the most troublesome are normally calcium and magnesium carbonates. Scale can be reduced or prevented by softening the makeup water with lime and soda ash, zeolites, sulfuric acid, soluble phosphates, or sodium chromate. Regardless of the water-treatment method used, a systematic program of blowdown should be established to control the dissolved solids in the cooling water. The choice of method for water treatment is largely one of an economic nature; since the treatment requires close regulation and control, a competent chemist should be consulted.

Cold weather.—For adapting performance to temporary or seasonal decreases in heat load, and especially for winter operation, two-speed motors are used for fan drives. The chief advantage is that at half speed, fans need only about 15 per cent of their full-speed power. Particularly in multifan units, the flexibility of two-speed motors saves power.

During the winter months when it is not cold enough to shut down the fans completely yet cold enough that ice tends to form at full fan speed, icing may be minimized or eliminated by operating some or all of the fans at half-speed.

Extremely cold water normally does not increase performance to any great extent, but operating hazards are increased considerably. Cooling towers operated in freezing weather are subject to ice formation at the air inlets; small amounts of water are likely to freeze on the inlet louvers and the nearby wood filling. Ice starts to form on the lower section of louvers and progresses upwards; this accumulation of ice restricts the inlet area and reduces the air flow, thus increasing the temperature of the water being circulated through the tower.

The main mass of the tower circulating water is rarely cooled to a temperature that even approaches freezing; in fact the cold-water temperature will seldom be lower than 60° F., except with towers used for specific operating conditions. For this reason, ice will form only on parts of the tower that are lightly wetted by fine drops which splash toward the entering air stream.

To prevent icing during cold-weather operation, one or more of the following procedures are recommended for induced-draft towers: (1) shutdown fans completely but do not shut off water; this may retard ice formation; (2) cover upper portion of louvered area; (3) shut off some of the cells.

If ice should form on the louvers and filling, one of the following methods of removal could be used: (1) reversing (for a limited time) the rotation of the motor driving the fan and thus blowing the warm air backwards and out through the louvers; (2) shut down some fans temporarily but do not shut off water; (3) cover upper portion of louvered area.

Maintenance. — Well-maintained equipment gives the best operating results and the least over-all maintenance cost. A regular schedule should be set up for the mechanical maintenance of cooling equipment. Follow instructions issued by manufacturer for proper lubrication of mechanical equipment.

Clean and paint all corrodible metals as required. Redwood does not require protection from the weather, but in some cases it may be desirable to paint it for appearance. Tighten all loose bolts, making allowance for the swelling of wood when wet.

In general, air-cooled exchangers require the same maintenance as do cooling towers, because similar mechanical equipment is employed. Certain fouling factors are used when estimating the size and performance of a finned-tube cooling unit; increased operating temperatures and greater pressure drop through a heat exchanger frequently indicates excessive fouling and the need for cleaning the tubes, internally and/or externally.

Fig. 1—Portion of El Paso Natural Gas Co.'s system on which the new compressor-station equipment will be installed. Lines capacity will eventually be increased by 300 million cubic feet per day.

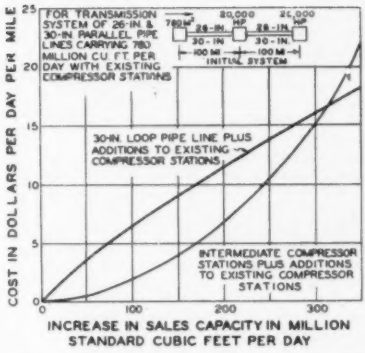

Fig. 2—Relative cost of increasing sales capacity by looping line and by intermediate compressor stations.

El Paso Natural undertakes first large-scale installation of

Gas-Turbine Centrifugal Compressor Stations

. . . for gas pipe-line pumping

by J. F. Eichelmann* and J. S. Quill†

THE first large-scale installation of gas-turbine-driven centrifugal compressor stations for natural-gas pipe lines will be undertaken by El Paso Natural Gas Co. The part of El Paso's pipe-line system in which this equipment is to be installed extends from the West Texas-New Mexico border to the California border and consists of a 26 and 30-in. pipe in parallel as shown on Fig. 1.

Current delivery capacity of this line is approximately 755 million standard cubic feet per day. This capacity is to be increased to approximately 855 million standard cubic feet per day in the immediate future and later to 1,055 million standard cubic feet per day. The line operates at a maximum pressure of 838 psia.

In order to find out whether it is more economical to install booster stations or to loop the line, let us consider a section of the El Paso line, 200 miles in length with a delivery capacity of 760 million standard cubic feet per day with 20,000-hp. reciprocating compressor stations located 100 miles apart. For small increments of flow only part of the line is looped, the length of loop being that required by the flow when a compression ratio of 1.5 is maintained at the compressor stations. The horsepower of the compressor station is then increased as required.

In comparison, we substitute the loop requirements with intermediate booster stations. The results of the comparison, Fig. 2, show that centrifugal booster stations are more economical for approximately 300 million standard cubic feet per day of additional flow, and that looping is less expensive for larger flow.

El Paso Natural Gas Co. will install seven 5,000-hp. gas-turbine-driven centrifugal compressor stations for the first 100 million standard cubic feet per day increase in delivery capacity of the line, and 18 additional units for the future 200 million standard cubic feet per day increase.

Centrifugal compressors manufactured by Clark Brothers, Inc., DeLaval Steam Turbine Co., and Ingersoll-Rand Co. will be installed in these stations. These centrifugal compressors are directly driven by the gas-turbine output shaft. All compressors are single stage and approximately 82 per cent efficient at rated load. All of the casings, with impeller changes, are designed to take a future flow of 1,100 million standard cubic feet.

The gas turbine to be installed on El Paso's system was specially designed by General Electric Co. for gas pipe-line pumping. Rating of the gas turbine is 5,000 hp., 5,000 r.p.m., 80° F., 1,000 ft. altitude, 25 per cent thermal efficiency based on lower heating value of the fuel.

The special features that make this turbine particularly desirable for pipe-line pumping are:

1. The turbine portion is broken into two sections each driving a separate shaft, one for the axial air compressor and the other to drive the load. With this arrangement, constant horsepower output over a wide range of speed on the load compressor can be obtained by running the axial air compressor shaft at different speeds.

2. A regenerator has been added to recover and utilize heat that would otherwise be wasted in the exhaust, thus resulting in a higher thermal efficiency.

Fig. 3 shows the operating limits of horsepower as a function of speed for various ambients. For a given ambient, it is possible to operate at any load up to the limit shown on the curve over the speed range from 2,000 to 5,500 r.p.m.

Since the horsepower characteristic of the gas turbine is very flat in the vicinity of 5,000 hp. (the rating of the turbine), the compressor can be selected to deliver approximately 5,000 hp. at any speed ranging from, say, 4,000 to 5,500 r.p.m. By selecting a compressor to develop 5,000 hp. at 4,500 r.p.m., the compressor can be speeded up in the wintertime to absorb 6,300 hp. available from the gas turbine at 40° F. ambient.

The 80° F. fuel consumption at various loads is superimposed on Fig. 3. The full-load fuel consumption is 10

*Chief engineer, El Paso Natural Gas Co., El Paso, Tex. †Application engineer, Industrial Engineering Divisions, General Electric Co., Schenectady, N. Y. Portion of paper presented at spring meeting, Natural Gas Dept., A.G.A., Dallas.

cu. ft. per brake-horsepower-hour of fuel having a lower heating value of 1,020 B.t.u. per cubic foot.

The effect of ambient on load limit is also shown on Fig. 3. The turbine develops its full rating, 5,000 hp., at 80° F. ambient, and when the ambient is 40° F., the unit will develop approximately 6,300 hp. or 25 per cent above rated load.

A cross-section of the turbine is shown on Fig. 4. The ducts going to and returning from the heat exchanger are shown, although the heat exchanger itself is not shown. The fact that the load shaft is independent does not make much difference in exterior appearance since both turbine wheels are enclosed in the same housing.

Description of Station

The building is relatively small in size, 50 by 50 by 40 ft., or approximately 10 cu. ft. per horsepower. The disassembly area will permit bringing in a complete power plant and putting it on location with a crane, thus saving installing time and expense. The light weight of the power plant—45,000 lb.—makes this possible. Four-unit stations are contemplated for the future expansion.

The regenerator is a shell and straight-tube type of heat exchanger, the shell being the high-pressure side. The regenerator which forms the base of the exhaust stack is 10 ft. in diameter, 28 ft. long, and contains approximately 5,000 1¼-in. o.d. tubes.

The evaporator cooler air filter is a dual-purpose equipment. Its primary function is to lower the temperature of intake air during high ambient operation. For example, on a 100° F., 20 per cent relative-humidity day, the effective ambient is approximately 69° F. wet bulb temperature for that day. Under these conditions, the summertime output can be increased by more than 15 per cent by evaporative cooling.

Two sets of sprays are located in the evaporator cooler, one for evaporation and one for continuous washdown of the filter equipment. The tank is built into the base of the equipment for water storage. Only about 15 g.p.m. is required for such operation.

Four sources of auxiliary power are provided in the station. A 150-psi. air-supply system is used for instruments and miscellaneous valve operation. A 125-volt d.c. station battery is used for control power, ignition, emergency lights, and for supplying lubricating oil pressure during starting and stopping.

A 75-kw. generator gear driven from the gas turbine provides the auxiliary power for all motors in the station during the operation of the gas turbine. A small gas-engine-driven generator provides a.c. power in the station for charging the station battery when the gas turbines are shut down.

Gas turbine auxiliaries: One 1.5-hp. a.c. cooling-water pump (cooling of gas-turbine parts). Two 3-hp. d.c. lubricating-oil pumps (used during starting and stopping only). One 1-hp. d.c. cooling-water pump (standby for above. Used during starting and stopping).

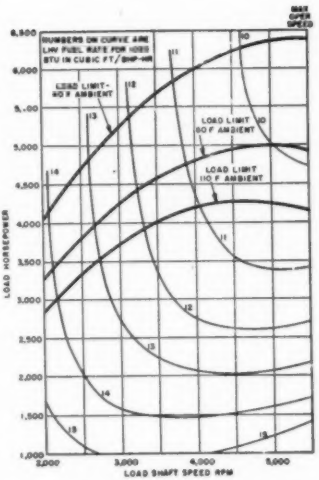

Fig. 3—Load shaft speed vs. load horsepower for 5,000 hp. two-shaft gas turbine with regenerator at various ambient and fuel rate values. Thermal efficiency 25 per cent at 80° F. and 1,000 ft. altitude.

Centrifugal compressor auxiliaries: One 7.5-hp. a.c. seal oil pump (standby to shaft-driven pump).

Evaporative cooler: One 10-hp. a.c. spray pump for evaporation. One 15-hp. a.c. water pump for filter wash.

Station auxiliaries: One 7½-hp. a.c. water pump for lubricating-oil coolers. One 15-hp. a.c. cooler pump for fin-fan blowers. One 7½-hp. air compressor. Two 2-hp. a.c. vent fans for turbine room. One feeder for 15-g.p.m. water supply system.

The water requirements of the station are relatively small because it is expected that after-cooling of the pipe line gas will not be required.

Lubricating-Oil System

A common lubricating-oil system is used for both the gas turbine and centrifugal compressor. The oil supply consists of an 850-gal. tank located beneath the starting turbine. The main turbine lubricating-oil pump is gear driven from the turbine. This is supplemented by two d.c. pumps for use during starting and stopping.

The centrifugal-compressor high-pressure seal-oil pump is gear driven from the centrifugal compressor and an a.c. high-pressure standby seal-oil pump is also provided.

The lubricating-oil temperature of 130° F. is maintained by circulating 225 g.p.m. of 115° F. cooling water in the oil coolers with a 5° F. rise in the cooling water. The tube material is arsenical admiralty metal and two oil coolers are used, one of which is a spare. With a recirculating water system between the coolers and the fin-fan radiators, the design is conservative.

Starting

The gas turbine is started by means of a mechanical drive turbine operating from gas-line pressure. It is not expected that frequent starting will be necessary, and the 35,000 cu. ft. of gas used for each start is justified by the increased reliability of this starting means over any other method. The expanded gas is exhausted to atmosphere.

The starting is completely automatic. When the master start switch is placed in the "on" position, the d.c. lubricating-oil and cooling-water pumps are started. When the d.c. pumps have filled the compressor overhead seal-oil tank, the starting turbine brings the gas turbine up to 10 per cent speed where the turbine system is purged for 3 minutes. The turbine is now fired and accelerated to 60 per cent idling speed where the a.c. auxiliaries are started and the starting sequence is completed.

Stopping

When the stopping signal is given the fuel is stopped, the regenerator is bypassed, and the main suction and discharge gas valves are closed. The load turbine shaft is expected to come to rest in approximately 6 to 8 minutes and the high-pressure turbine shaft will come to rest in approximately 15 minutes. Provisions are in-

(Continued on page 110)

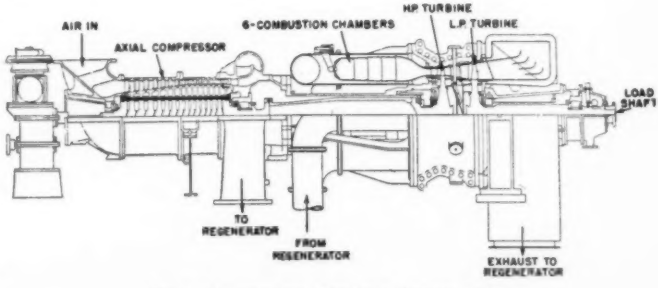

Fig. 4—Cross-sectional drawing of 5,000-hp. turbine.

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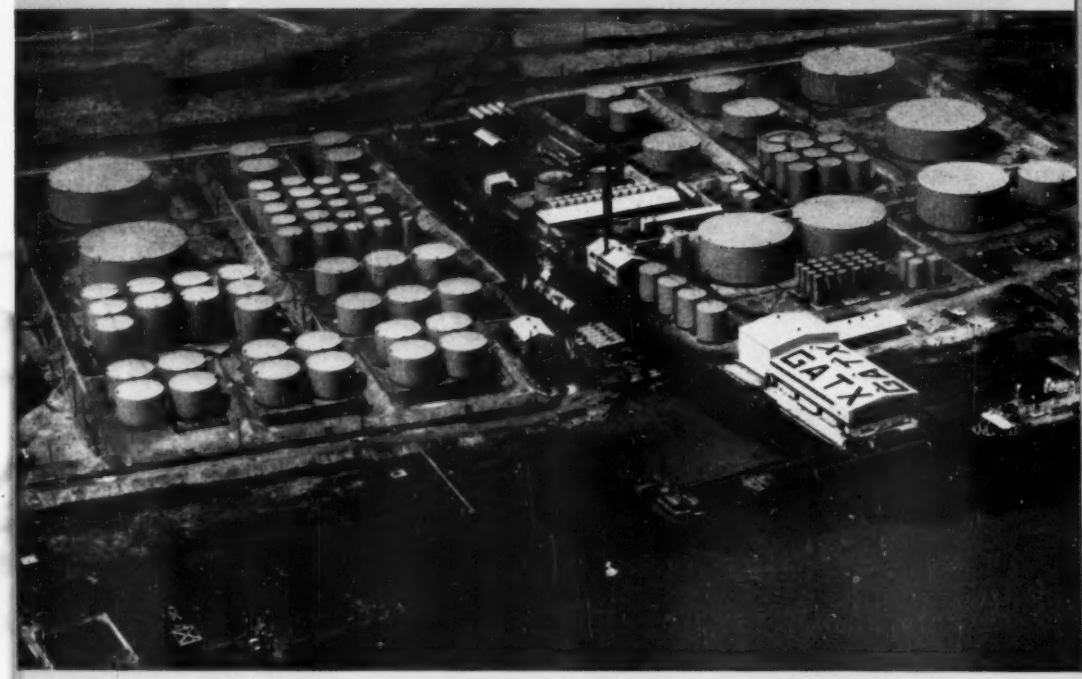

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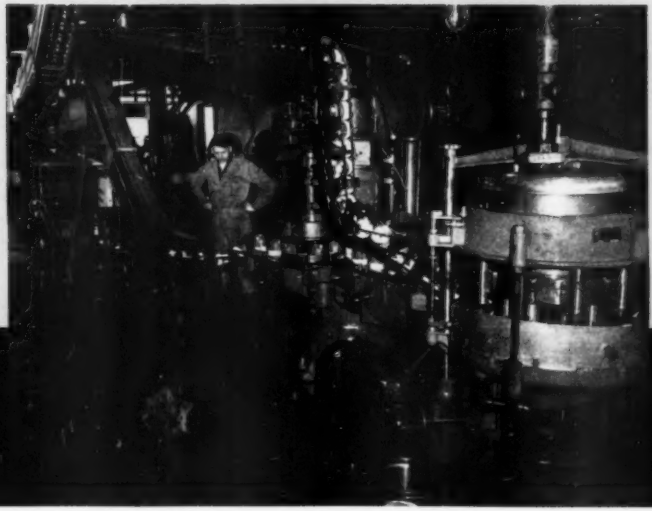

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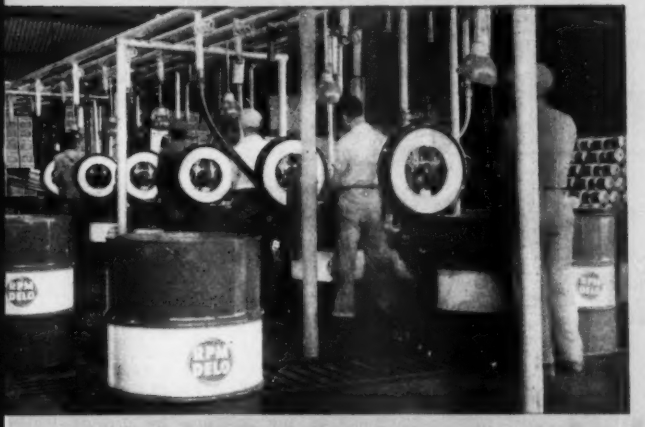

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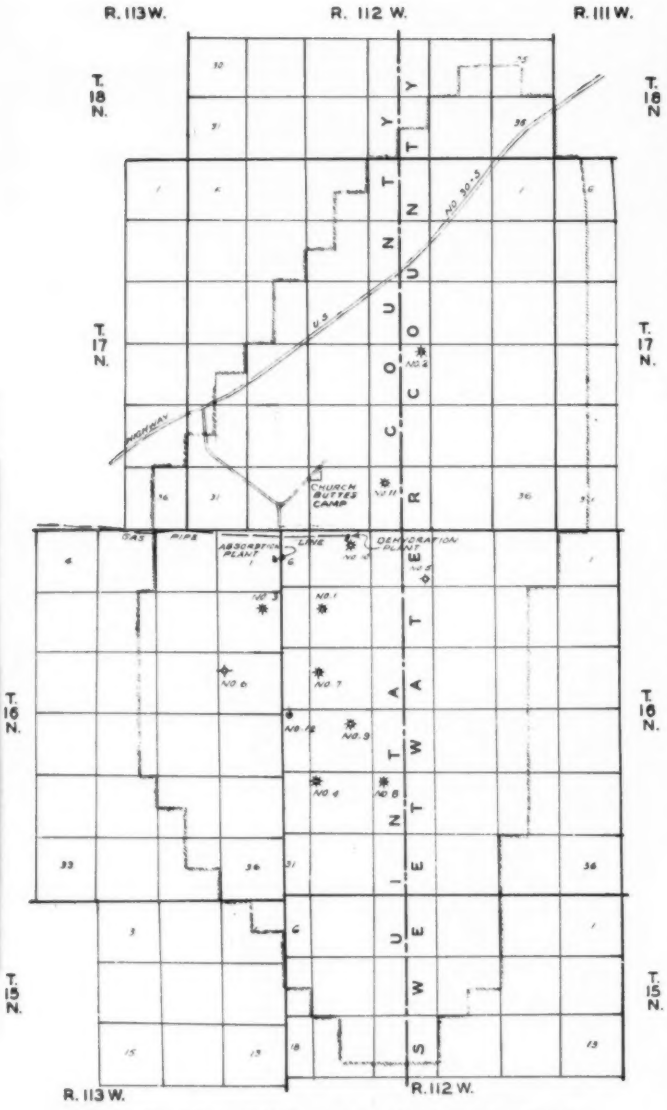

Map of Church Buttes field, Sweetwater and Uinta counties, Wyoming.

Engineer describes

Drilling and Completion Practices at Church Buttes

by W. C. Dinger*

CHURCH BUTTES, one of the deepest, highest-pressure gas fields in the Rocky Mountain area, is located 50 miles west of Rock Springs, Wyo., and 3¾ miles south of Lincoln Highway U. S. 30-S.

The structure, discovered by seismograph surveys conducted in 1941, is anticlinal and trends in a north-south direction. Development is in the Dakota sandstone of the Cretaceous age.

The discovery well was completed in April 1946, and 11 wells have been drilled since that time. The producing depths are from 12,433 to 13,053 ft., with the productive capacity of the producing wells ranging from 3 to 15 million cubic feet of gas per day. The flowing pressures are from 3,000 to 4,500 psi. and the liquid content of the gas is 6 to 8 bbl. per million cubic feet.

The field is owned jointly by Mountain Fuel Supply Co., of Rock Springs, Wyo., and Union Pacific Railroad Co. The drilling and development have been by Mountain Fuel Supply Co., operator for the field.

The geological and geophysical work was done on this area before the acreage was unitized, and the unit agreement was completed prior to drilling the first test well. Union Pacific Railroad Co.'s interest is 49 per cent, with the remaining 51 per cent being owned by Mountain Fuel.

Production was discovered by the completion of Unit Well No. 1 at a depth of 12,666 ft. in the Dakota sandstone. Of the 12 wells drilled in the field, 3 have been nonproductive. A hydrocarbon removal and dehydration plant has been completed since that time. Locations of the wells and plant are shown on the accompanying surface map of the unit area.

Description of Reservoir

Structure.—Church Buttes gas field is an elongated anticlinal structure approximately 8 to 9 miles long and 3 to 4 miles wide, trending in a north-south direction. The Dakota sandstone is encountered at depths ranging from 12,400 to 13,000 ft. in three main zones separated by relatively thin shale sections.

The Frontier sandstone, above the Dakota and separated by the Aspen shale, has been cored and tested but commercial production is not present in this formation. The Nugget sandstone, at approximately 14,500 ft., also has been cored and tested but salt water was recovered in the drill-stem tests. No major faulting has been found in the structure by drilling.

Sand characteristics.—The reservoir sandstones of the Dakota formation are of Cretaceous age. The three main sands are light gray, fine to coarse, hard to soft, and are separated by light gray, bentonitic, hard shales which have a tendency to cave. Sands

*Petroleum engineer, Mountain Fuel Supply Co., Rock Springs, Wyo. Presented at A.P.I. Division of Production meeting, Casper, Wyo.

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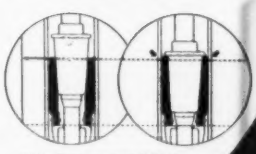

Note how cup assembly is expanded laterally (not compressed) to avoid crushing!

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are very well consolidated, and they range from 115 to 173 ft. aggregate net thickness in well-bore exposures. The core data consist of complete analyses of all three zones.

Average porosity of the reservoir sands in the wells drilled ranges from 8 to 21 per cent and the permeability variation is appreciable, with individual values ranging from 14 to 750 md. in the producing sections. It is very difficult to stratigraphically correlate the three main sands because of lenticularity in the Dakota formation and the variation in porosity and permeability. Part of the sands have permeabilities of less than 1 md., but these are not considered commercially productive since a section of this nature was perforated and tested in one of the wells.

Reservoir fluids. — The original fluid saturations in the Dakota sands range from 41 to 56 per cent water, and from a trace to 3 per cent oil saturation. The fluids as recovered at the plant range from 6 to 8 bbl. condensate, and 1 to 2 bbl. water per million cubic feet of gas produced. The condensate has a tank gravity of 53° A.P.I. At the time of the discovery the pressure in the reservoir was about 7,040 psi. at the datum depth of —5,835 ft. subsea, and the temperature, 250° F.

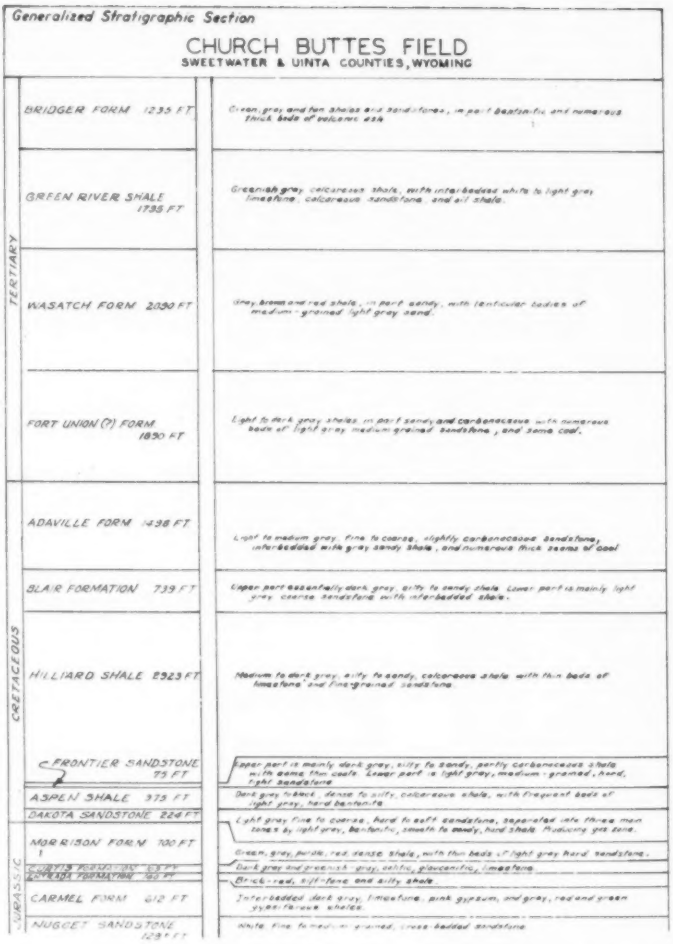
After completion of Unit Well No. 1, surface samples of the liquid and gas were studied for the purpose of determining the properties of the samples when recombined in the produced ratio and under the pressure and temperature of the reservoir. It was found from these tests that the reservoir gas is a retrograde gas and that no hydrocarbon liquid is present in the reservoir.

Drilling and Completion

Drilling is relatively uncomplicated in the areas as there are not any of the difficulties encountered such as crooked holes, lost circulation, or drilling-mud problems. A 12¼-in. surface hole is drilled and opened to 17½ in. with 250 to 300 ft. of 13⅜-in. casing set and cemented to the surface. The only disturbance in the mud is encountered when the trona beds in lower Green River formation are drilled at 2,600 to 2,800 ft. Trona is essentially sodium carbonate, which increases the pH, viscosity, and gels of the mud. However, additions of water and chemicals to lower the pH of the mud are made without any difficulty.

The intermediate string of casing is 9⅝-in. o.d., 6,000 ft. long and cemented with 600 sacks in a 12¼-in. hole. As the float collar and cement plug are being drilled, the drilling mud is converted to a calcium-base mud using lime and calcium ligonsulfonate. A crude oil is also added to emulsify the mud and used to total depth in drilling the 8⅝-in. hole.

Before the 6⅝-in. production string is brought to the well, each joint is hydrostatically tested to 6,000 psi. for 1 minute.


Generalized Stratigraphic Section
CHURCH BUTTES FIELD
SWEETWATER & UINTA COUNTIES, WYOMING
TERTIARY
BRIDGER FORM 1235 FT.
Green, gray and tan shales and sandstones, in part bentonitic and numerous thick beds of volcanic ash
GREEN RIVER SHALE 1795 FT.
Greenish gray, calcareous shale, with interbedded white to light gray limestone, calcareous sandstone, and oil shale.
WASATCH FORM 2090 FT.
Gray, brown and red shale, in part sandy, with lenticular bodies of medium-grained light gray sand.
FORT UNION (?) FORM. 1850 FT.
Light to dark gray shales, in part sandy and carbonaceous, with numerous beds of light gray, medium-grained sandstone, and some coal.
CRETACEOUS
ADAVILLE FORM 1498 FT.
Light to medium gray, fine to coarse, slightly carbonaceous sandstone, interbedded with gray sandy shale, and numerous thick seams of coal
BLAIR FORMATION 739 FT.
Upper part essentially dark gray, silty to sandy shale. Lower part is mainly light gray, coarse sandstone with interbedded shale.
HILLIARD SHALE 2923 FT.
Medium to dark gray, silty to sandy, calcareous shale with thin beds of limestone and fine-grained sandstone.
FRONTIER SANDSTONE 75 FT.
Upper part is mainly dark gray, silty to sandy, partly carbonaceous shale with some thin coals. Lower part is light gray, medium-grained, hard, tight sandstone.
ASPEN SHALE 373 FT.
Dark gray to black, dense to silty, calcareous shale, with frequent beds of light gray, hard bentonite.
DAKOTA SANDSTONE 224 FT.
Light gray, fine to coarse, hard to soft sandstone, separated into three main zones by light gray, bentonitic, smooth to sandy, hard shale. Producing gas zone.
JURASSIC
MORRISON FORM. 700 FT.
Green, gray, purple, red, varicolored shale, with thin beds of light gray hard sandstone.
CURTIS FORMATION 63 FT.
SUNDANCE FORMATION 167 FT.
Dark gray and greenish gray, calcitic, glauconitic limestone.
CARMEL FORM. 612 FT.
Brick-red, siltstone and silty shale.
Interbedded dark gray, limestone, pink gypsum, and gray, red and green gypsiferous shales.
NUGGET SANDSTONE 1291 FT.
White, fine to medium-grained, cross-bedded sandstone.

Before the float collars and/or plugs are drilled, each string of casing is tested for 1 hour. The 13⅜-in. casing is tested to 1,500 psi., the 9⅝-in. tested to 2,500 psi., and the 6⅝-in. production string tested to 5,400 psi. In these tests that part of the christmas tree involved is also tested and the tubing head is tested with water to 10,000 psi. prior to installation.

In drilling the wells to this depth, 120 to 125 days are required and the number of rock bits varies from 136 to 147. The drilling time and number of bits have been reduced since the oil-emulsion mud has been used.

Diamond coring is used for all drilling from the top of the Dakota through the three main sands, which usually requires two or three heads.

The earlier wells were completed with a packer on the tubing with the annulus filled with mud, but the later wells were completed without the packer. If corrosion should develop in the tubing, then it would be possible to lubricate the corrective chemicals into the annulus. In the tubing caliper surveys that have been run, there is no conclusive evidence that corrosion is taking place. Also, samples of water from the plant have been tested for iron content increases, but these data are not conclusive.

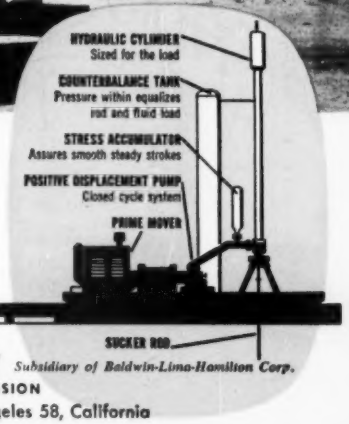
The tubing is hung 30 ft. above the liner hanger, mud displaced with water, and the wells completed.

After the wells are completed and the drilling derricks are removed, the

(Continued on page 110)

PELTON

Long Stroke Hydraulic Pumping Jack



Here in a West Texas field is a typical installation of a PELTON Long Stroke Hydraulic Pumping Jack. This is the most modern, most efficient surface pumping unit ever devised for the sucker rod pumping of oil wells. With PELTON, each well may be pumped to its maximum potential and lifting costs reduced to the absolute minimum.

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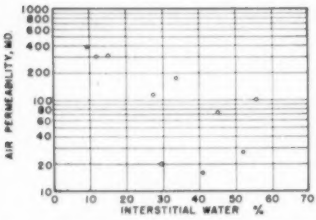


Fig. 1—Vedder pool, Wasco field, capillary interstitial water. Air displacement method, sample from six wells.

Wasco Field Experience With Natural Water Drive Lends Encouragement to Artificial Flooding Prospects

by N. Van Wingen*

Vedder pool of Wasco field is the first deep reservoir in California to approach economic depletion. The pool, which was discovered in 1938, comprises 500 acres. It has been subject to an active water drive to an extent that the current pressure is only 10 per cent less than the initial. As the oil was considerably undersaturated, the saturation pressure was not reached. The ultimate recovery factor is indicated to be 50 per cent of the tank oil initially in place, which is compatible with the recoveries obtained from water drive pools in other sections of the United States. From a theoretical displacement efficiency standpoint, there is no essential difference between a natural and an artificial water-drive mechanism. Accordingly, the fact that a California reservoir has shown a successful response to a natural water drive lends encouragement to artificial flooding prospects.

WASCO field, located in the San Joaquin Valley in Kern County, California, 5 miles west of Wasco, was discovered in 1938 as a result of seismic work. The discovery well, Continental Oil Co. KCLA-2, was drilled to the then world record depth of 15,004 ft., and, when plugged back and perforated from 13,092 to 13,175 ft., established a new word record production depth. The initial production rate was 3,663 bbl. per day of 35.7° A.P.I. oil with a gas-oil ratio of 470 cu. ft. per barrel.

Geologic Data

The Wasco structure is an elongated dome, the longitudinal axis of which trends northwest and southeast. The field had an initial productive area of 500 acres, and a closure of 85 ft. There is no evidence of faulting in the reservoir.

The productive measures of Vedder pool are of Lower Miocene age and are encountered at an average depth of 13,000 ft. at Wasco. They are generally considered to be the equivalent of the Vedder zone found at Mount Poso, Rio Bravo, and other fields in this area. In September 1949 Standard Oil Co. of California deepened its 5 Mushrush to 15,866 ft. for a test of the Eocene sand. Although production was obtained at this depth, performance has not been sufficiently attractive to encourage an aggressive drilling program.

*Petroleum Technologists, Inc., Montebello, Calif. Presented at A.P.I. Division of Production meeting, Los Angeles.

Reservoir Characteristics

Sand characteristics.—The Vedder formation at Wasco is a hard and well-consolidated sandstone. Core-analysis data are relatively meager. A total of 62 samples from four wells were analyzed for porosity and permeability, for 11 of which interstitial water determinations were also made by the capillary (air displacement) method (see Fig. 1). On the basis of these data, the average porosity and permeability are 15.4 per cent and 278 md., respectively. The above permeability was computed on the basis of an arithmetic average of the available data. An average permeability of 1,500 md. is obtained if the average specific productivity index, as determined by depth-pressure measurements, is converted to an equivalent laboratory permeability on the basis of the Johnston-Sherborne empirical correla-

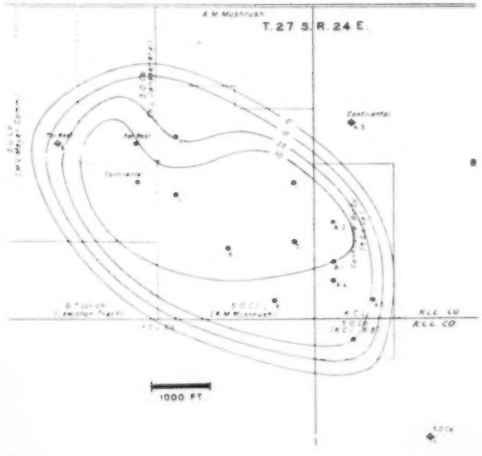


Fig. 2—Vedder pool, Wasco oil field, isopachous map of productive A-2 sand. (Initial conditions.)

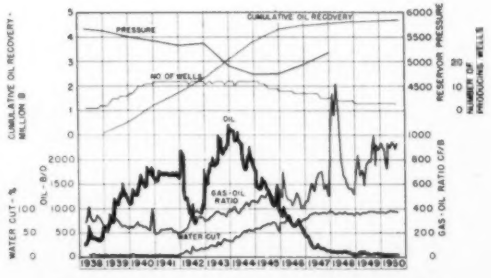
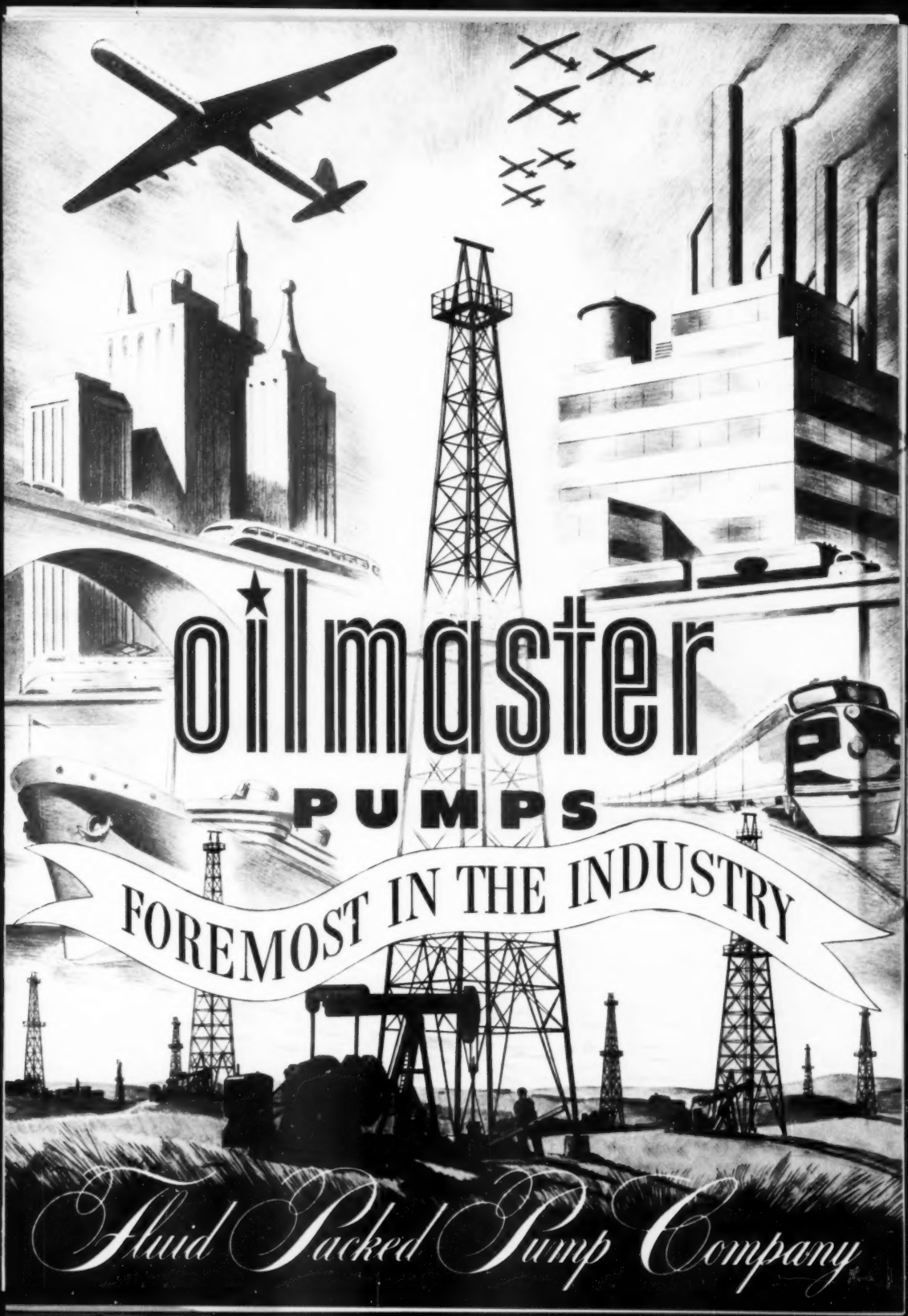


Fig. 3—Performance of Vedder pool, Wasco field.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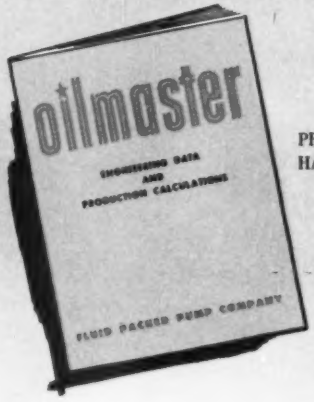
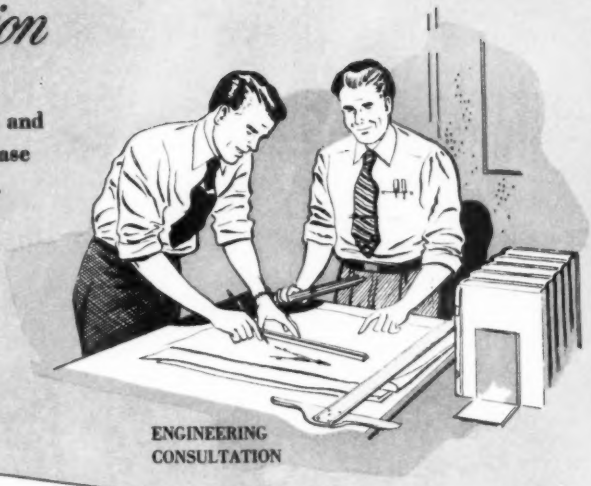


PRODUCTION HANDBOOK



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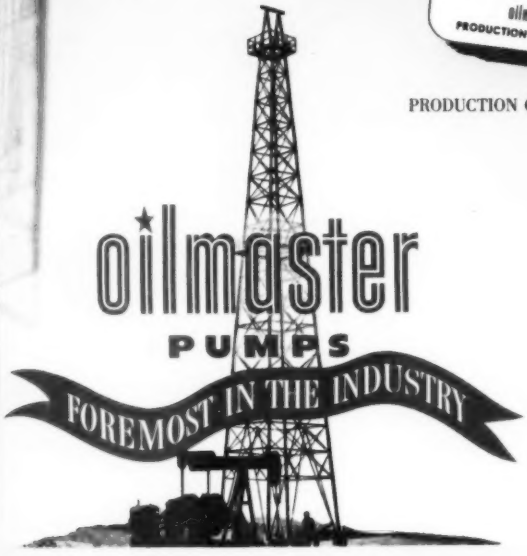

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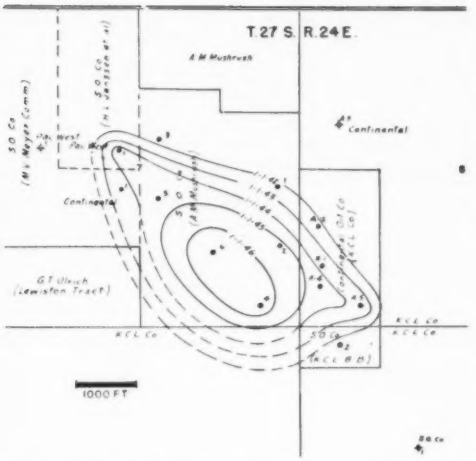

Fig. 4—Vedder pool, Wasco oil field, water encroachment pattern. Contours at 10 per cent cut.

tion for California fields.[1] This discrepancy is not surprising in view of the small number of samples which were core analyzed. It is felt that 1,500 md. is more representative of true reservoir conditions.

Fluid characteristics.—The capillary interstitial water curve (Fig. 1) indicates that the original value of the interstitial water content is somewhat less than 10 per cent for an average permeability value of 1,500 md., and 15 per cent for 278 md. As this range is rather wide it was attempted to establish an interstitial-water value on the basis of an interpretation of electric logs. The deep lateral and the self-potential curves indicate that the Vedder sand is not clean, and in several of the logs a strong indication of the presence of a thin shale body is found which may separate the sand into two parts. Thus, a quantitative evaluation of interstitial water by means of the Archie formula[2] will not be accurate, as the latter is applicable only to clean sands. Accordingly, interstitial-water values ranging from 37 to 48 per cent, as computed by the Archie formula, are not considered to be reliable.

It is evident from the preceding discussion that available data are inadequate to quantitatively indicate the original interstitial-water value. However, from a qualitative evaluation of all available information and analogy to other comparable reservoirs, it is believed to be 15 per cent.

The reservoir had an original pressure and temperature of 5,660 psi. and 277° F., as determined by subsurface surveys. A P-V-T study was made by the production technology laboratory of Standard Oil Co. of California in 1938 on oil and gas samples taken from Continental Oil Co.'s well KCLA-2. The following data were established for the original reservoir conditions: Formation-volume factor, 1.244; solution gas-oil ratio, 390 cu. ft. per barrel; and oil viscosity 0.55 cp. The oil was considerably undersaturated at initial conditions as the bubble-point pressure is indicated to be 1,480 psi.

Tank oil in place. A count of the productive sand in each well was made on the basis of a study of core data and the electric logs. On the basis of these data the isopachous sand map, Fig. 2, was prepared. Data pertaining to markers and sand thicknesses are not available on the southwest flank as no wells were drilled in that portion of the field. Therefore the configuration of southwest contours is subject to interpretation.

The isopachous map was planimetered and the total bulk sand volume was determined to be 11,730 acre-ft., with an average sand thickness of 24 ft. Combining bulk volume data with the sand and fluid characteristics information, the total initial tank oil in place is 9.56 million barrels (815 bbl. per acre foot) and the original gas in place is 3.72 million M.c.f. (see Table 1). These volumetric calculations are substantiated by water-encroachment calculations, as discussed later in this report.

An attempt to determine the original tank oil in place by the material-balance method of calculation was unsuccessful, principally because of the small amount of pressure decline during the life of the pool.

Reservoir Performance

Reservoir performance data for the Vedder zone are summarized in Table 2 and Fig. 3. The curve trends are characteristic of those of a pool with an active water drive as exemplified by rapidly increasing cut, relatively low gas-oil ratio, and slowly declining reservoir pressure. Except for a period of severe curtailment in

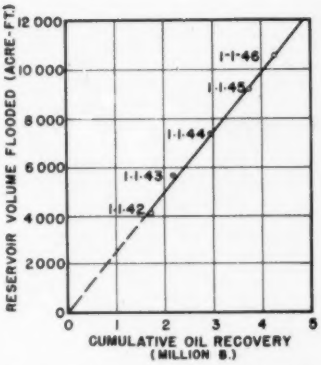

Fig. 5—Vedder pool, Wasco field, water encroachment vs. cumulative oil recovery.

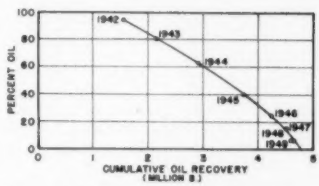

Fig. 6—Vedder pool, Wasco field, cumulative oil recovery vs. per cent oil.

TABLE 1—RESERVOIR CHARACTERISTICS, VEDDER POOL, WASCO FIELD

Sand characteristics	
Porosity, per cent	15.4
Permeability, millidarcies*	1,500
Interstitial water, per cent	15
*Specific productivity index data. Core-analysis data indicate an average permeability of 278 md.	
Fluid characteristics	
Initial solution gas-oil ratio, C.F./bbl.	390
Initial formation-volume factor	1.244
Initial oil viscosity, cp.	0.55
Reservoir characteristics	
Initial reservoir pressure, psi.	5,660
Reservoir temperature, °F.	277
Initial productive acres	500
Initial productive acre-feet of sand	11,730
Initial average sand thickness, ft.	24
Tank products initially in place	
Oil, million barrels	9.56
Gas, million M.c.f.	3.72

TABLE 2—PRODUCTION STATISTICS, VEDDER POOL, WASCO FIELD

Date	Accumulative production — Oil Million bbl.	Gas Million M.c.f.	Water Million bbl.	Per cent cut at first of year	Reservoir pressure psi.	No. Wells producing
1-1-39	0.143	0.045	0.006	1		2
1-1-40	0.555	0.161	0.013	1		7
1-1-41	1.135	0.308	0.024	3		12
1-1-42	1.783	0.447	0.052	9	5335	12
1-1-43	2.214	0.576	0.134	19	5360	11
1-1-44	3.026	0.869	0.498	33	4915	12
1-1-45	3.822	1.200	1.353	59.2	4745	12
1-1-46	4.294	1.437	2.332	71.8	4745	8
1-1-47	4.552	1.558	3.164	82.3	4930	7
1-1-48	4.633	1.611	4.133	95.1	5175	5
1-1-49	4.678	1.652	4.583	92.7		3
1-1-50	4.706	1.674	4.992	94.8		3
Nov. 50	4.721	1.687	5.262	93.7		2

Estimated ultimate recovery
Oil : 4.75 million barrels (50 per cent recovery factor).

1942, the oil-production rate exhibits the expected trend for this type of reservoir mechanism. Individual well histories follow trends similar to that of the entire pool. No secondary gas cap was formed because the pressure remained above the bubble point.

The pool had an initial period of approximately 4 years during which production was essentially clean and gas-oil ratios retained their initial values. It is of interest to note that the pool produced approximately 33 per cent of its indicated ultimate oil production during this period (16 per cent of the initial tank oil in place). Subsequently the cut started to increase, a trend which continued until it reached approximately 90 per cent near the end of the pool's life, since which rise it has remained relatively constant.

The pool was capable of substantial oil production until the cut reached a value of approximately 50 per cent, after which time oil production fell off rapidly. Up to the point where rapid production decline set in, the pool had produced approximately 80 per cent of its ultimate oil production (39 per cent of the initial tank oil in place).

The gas-oil ratio declined from a value of approximately 350 to 200 cu. ft. per barrel during the first 4 years of production. (See Fig. 3.) Subsequently, the gas-oil ratio gradually increased to about 700 cu. ft. per barrel in 1948, 7 years later. This behavior is interesting in view of the fact that subsurface operating pressures were substantially in excess of the saturation pressure. Several factors may have been responsible for departure of the gas-oil ratio from the saturation value of 390 cu. ft. per barrel. It is possible that the available data include only the gas taken from the separators.

The ratio of the separator gas to the oil is affected by the pressure and temperature of the separator. Thus, the gas-oil ratios shown on Fig. 3 may have been affected by reductions in trap pressure and by increasing trap temperatures caused by greater production of water. This may help to explain the apparent simultaneous increase in water cut and gas-oil ratio which began in 1942, and which is apparent on both a pool and on an individual well basis. It is also to be considered that gas is soluble in water to a considerable extent, especially at the high pressures encountered in this pool, as reported by Dodson and Standing.[3] The actually observed increase in gas-oil ratio, however, is approximately twice that which can be so accounted for.

Water Encroachment

Fig. 4 shows the position of 10 per cent cut lines at yearly intervals for the life of the pool. Ten per cent cut was chosen for this purpose because it gave the first definite indication that edge water had reached the individual wells. It is of interest to note that these lines are relatively smooth and uniform, and that their configuration conforms reasonably well with the structural contours of the Vedder sand.

By superimposing the 10 per cent cut lines on the isopachous map, total volumes of the reservoir flooded by water were calculated for successive time periods. These figures form a straight line when plotted versus the cumulative oil produced, as shown on Fig. 5. The slope of the line indicates a recovery of 410 bbl. per acre-foot flooded, or about 50 per cent of the oil in place. The line extrapolates back to the origin, substantiating the sand volume used in this study and the magnitude of the over-all recovery factor. This method would have disclosed any significant error in the previously estimated value of the bulk sand volume, since, in effect, it determines the reservoir volume existent beyond the outermost row of wells. The linear relationship observed on Fig. 5 indicates that the recovery efficiency was substantially constant throughout the reservoir.

An attempt to compute water encroachment by the Hurst method[4] was unsuccessful principally because of the very slight pressure decline occurring during the life of the pool.

Ultimate Recovery

As of January 1, 1951, the field had very nearly reached its economic limit and its production from the two remaining wells was only 45 bbl. per day oil with an average water cut of 95 per cent, as compared to the peak production rate of 2,720 bbl. per day from 12 wells in December 1943. As of January 1, 1951, the field had produced a total of 4.722 million barrels of oil, 1.688 million M.c.f. of gas, and 5.262 million barrels of water. It is evident that very little future production is to be anticipated and, therefore, the ultimate oil recovery is estimated at 4.75 million barrels.

Vedder pool's average cut history as a function of accumulative production is depicted on Fig. 6. Extrapolation of this relationship to a reasonable ultimate maximum cut value substantiates the above indicated ultimate recovery figure.

On the basis of the above figures, the ultimate oil recovery is indicated to be 50 per cent of the initial tank oil in place (405 bbl. per acre-foot), and the gas recovery is equivalent to 45 per cent of the initial gas in place. It is to be noted that the recovery figure checks the 50 per cent value independently obtained by the water-encroachment method fo calculation.

The nonrecoverable oil left in the reservoir at economic depletion is equivalent to a remaining oil saturation of 42 per cent of the pore space, which is higher than that commonly observed in other areas of the United States. Muskat[5] lists 69 water-drive reservoirs which show mean residual oil saturations ranging from 16-59 per cent and averaging 30 per cent. This difference is difficult to interpret because flooding test data are not available on Wasco cores. However, high residual-oil saturation might be due, at least in part, to low original interstitial-water saturation, possible error in this factor, the continuous nonexistence of a free-gas phase, and heterogeneity of permeability. An additional consideration is the fact that gross production rates averaged only 700 bbl. per day with a maximum of 1,500 bbl. per day. The wells were pumped from a depth of 3,000 to 5,000 ft.

It is pointed out that the value of the original water saturation which was taken as 15 per cent, is of substantial importance to the magnitude of the recovery factor. Since the original water saturation was not definitely established, the actual recovery factor might be in excess of the 50 per cent determined by this study, and the residual oil saturation correspondingly lower than 42 per cent.

Factors existent in Vedder pool that have been favorable to high recovery include the relatively thin formation, the continuity of the reservoir, the apparently even advance of the encroaching water, and the low oil-water viscosity ratio.

The recovery factor of 50 per cent is considerably higher than would have been expected in the absence of water drive. Muskat shows the mean recovery of 25 gas drive pools to be 33 per cent, which may be somewhat in excess of that obtained from many California reservoirs. Muskat also states that the mean recovery factor from 69 water drive pools is 52 per cent, which is in close agreement with the 50 per cent obtained from Vedder pool.

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BOOKS

SYMPOSIUM ON THE NATURE, OCCURRENCE, AND EFFECTS OF SIGMA PHASE. Published by American Society for Testing Materials, 1916 Race Street, Philadelphia 3. $2.50.

This symposium, consisting of 11 papers and discussions available in printed form, was presented at the 1950 annual meeting of A.S.T.M. under the title: "Effect of Sigma Phase on the High-Temperature Properties of Metals," and was sponsored by the joint A.S.T.M.-American Society of Mechanical Engineers committee on the effect of temperatures on the properties of metals.

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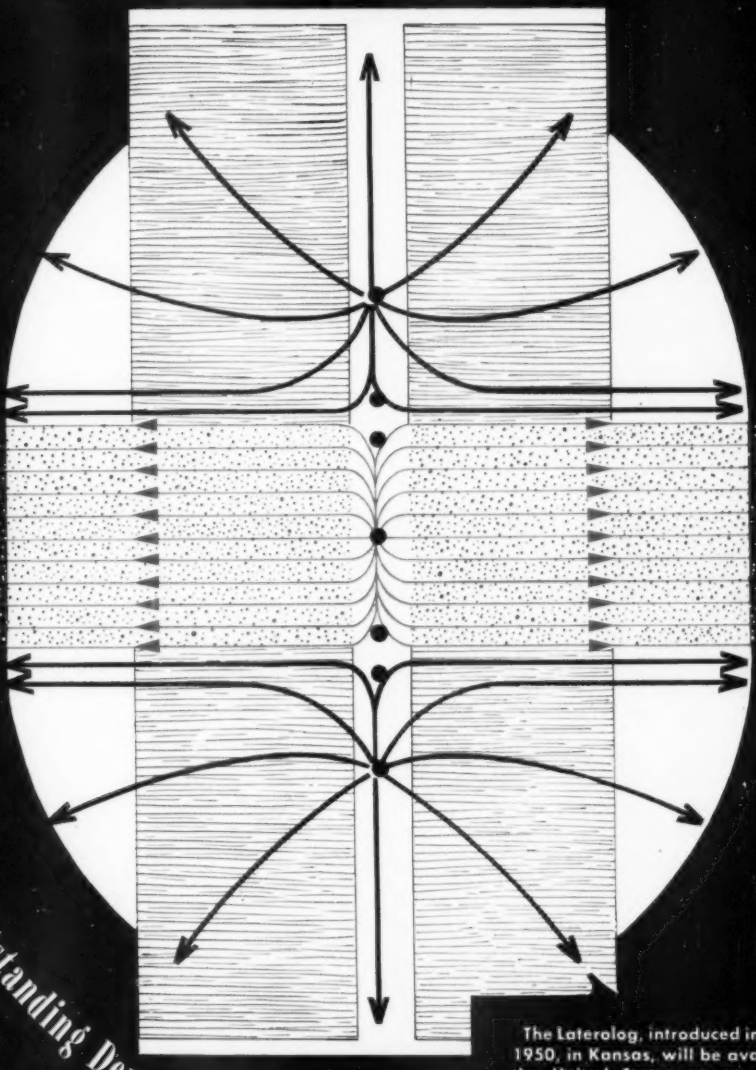

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BENZENE FROM PETROLEUM

How? and How Much?

by Gustav Egloff‡

THE fivefold increase in use of benzene as a chemical raw material over the 10-year period from 1940 to 1950 has brought about an acute shortage. This shortage is becoming more critical with the rapidly increasing demands resulting from our mobilization program. Even under normal conditions, the growing consumption of benzene-derived civilian products would present a sizable problem. The consumption for various products in 1948 and 1950, and estimates for 1951 on the basis of normal increases are listed in Table 1.

Actual requirements for 1951 will undoubtedly be higher than 232 million gallons because of defense needs. About 252 million gallons has been estimated as the actual amount in demand. This quantity would necessitate an increase of 33 per cent over the 1950 production of 188 million gallons. Looking 5 years ahead, demands are expected to be far greater. It has been estimated that if mobilization continues, 411 million gallons will be needed by 1955. The estimated annual benzene requirements for the 5-year period from 1951 to 1955 are given in Table 2.

The necessity of expansion to meet these requirements is evident from construction which is already planned or under way to increase production of benzene-derived products. Styrene capacity is being increased by about 200 million pounds a year which will require about 30 per cent more benzene than is now being used for that purpose. Phenol, the second largest consumer of benzene, has a present capacity of 350 million pounds per year and is being expanded by about 43 per cent or 150 million pounds. Aniline, now in short supply because of increased requirements for processing synthetic rubber, will be increased at least 20 per cent in the immediate future. Broad expansion of facilities for making other products is also planned. It has been stated that although detergent capacity in 1951 will be on the order of 1.2 billion pounds, it would be increased to 2 billion pounds if sufficient benzene were available.

Even in the happy but doubtful event that mobilization requirements should be less than anticipated, demands for benzene will necessitate large increases in production. It must be remembered that the estimates for growth are based on the consumption of known products, many of which were not on the market 10 years ago. It is safe to assume that many new products will probably be developed through research. Civilian requirements for benzene will probably rise markedly if the commercial development of new products is not hampered by restrictions on the construction of plants to manufacture them. Every effort should be made to reach a production of over 400 milion gallons of benzene annually by 1955.

With present capacity stretched to its limits, every potential source is being studied. These include coke-oven operation, imports, coal hydrogenation, and petroleum. Present indications are that almost all of the increases will necessarily come from petroleum. Formerly, the entire benzene output was derived from coke-oven operation which is tied to steel production. The rise in demand for steel has been less than one-fourth as great as the increase in chemical-grade benzene requirements. It is also true that in the expansion of steel production, provisions for increasing light-oil recovery and refining equipment were omitted in some cases. Furthermore, some gas plants found that it was more profitable to leave the light oil in the gas. The recent increases in benzene prices, however, are making maximum recovery more attractive.

‡Universal Oil Products Co., presented at annual meeting American Institute of Chemists, Niagara Falls, Ont., Canada.

TABLE 1—CONSUMPTION AND REQUIREMENTS OF CHEMICAL GRADE BENZENE*

(Millions of gallons)

Product—	1948 Consumption	1950 Consumption	1951 Requirements
Styrene	47	65	†82
Phenol—synthetic	39	41	50
Nylon	18	20	†25
Aniline	13	14	16
Synthetic detergents (cyclic)	7	10	12
DDT	1.5	5	6
Dichlorobenzene	5.5	5	6
Monochlorobenzene—other than phenol, aniline, DDT	5	5	6
Nitrobenzene—other than for aniline, DDT	4	4	4
Maleic anhydride	2	3	4
Diphenyls	3	3	3
Benzene hexachloride	1	2	3
Miscellaneous	14	10	15
Exports	2	1	
Total	162	188	232

*Data presented by L. A. Schlueter, chief, Aromatic Chemicals Section, Chemical Division, National Production Authority, before the Chemical Market Research Association, December 6, 1950.

†Data presented by L. A. Schlueter before the Synthetic Chemicals Association on March 15, 1951.

TABLE 2—ESTIMATED BENZENE REQUIREMENTS*

(Millions of gallons)

Year—	Total Requirements	% Annual Increase over Preceding year
1950	188	
1951	252	34.0
1952	307	21.8
1953	338	10.1
1954	379	12.1
1955	411	8.4
Total per cent increase over 5-year period		118.6

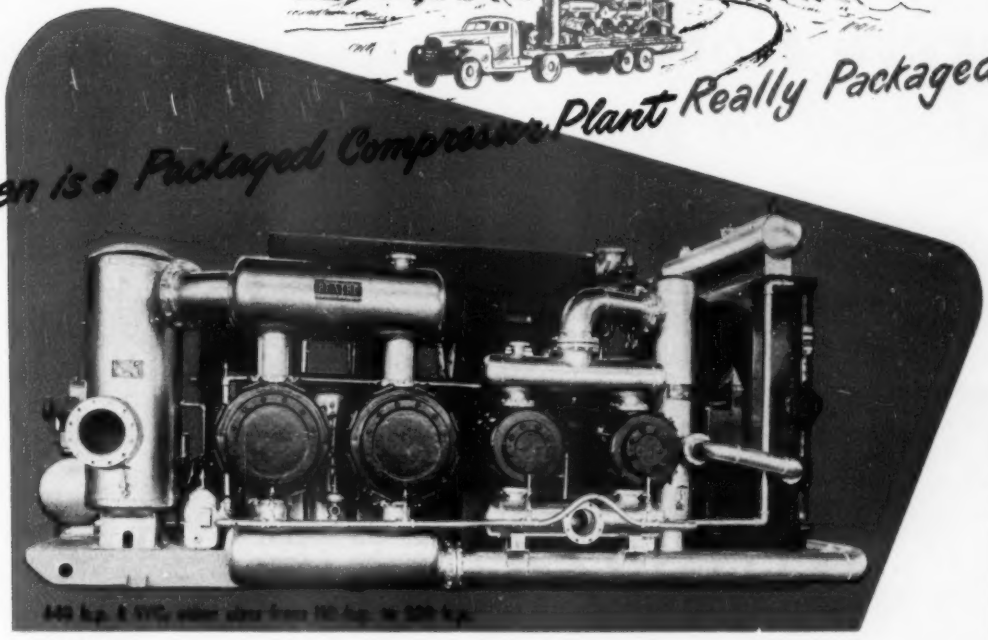
*Data presented by L. A. Schlueter before the Synthetic Chemicals Association on March 15, 1951.

New Sources

Studies are being made to increase light-oil recovery in existing plants so that 10 million gallons more of benzene will be made available annually. It is believed that an additional 10 million gallons can be made by expanding coking capacity as now planned. These increases would raise coke-oven benzene production from the present rate of 170 million gallons to 190 million annually. This amount, however, is the maximum expected from the steel industry. To meet requirements of 307 million gallons in 1952, about 120 million gallons must be derived from other sources.

Imports have been increased and are expected to reach 40 to 50 million gallons in 1951. The shortage of benzene, however, is world-wide and it

When is a Packaged Compressor Plant Really Packaged?



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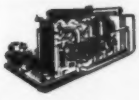

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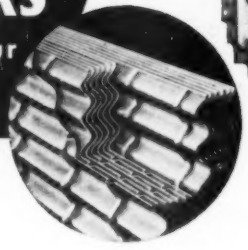

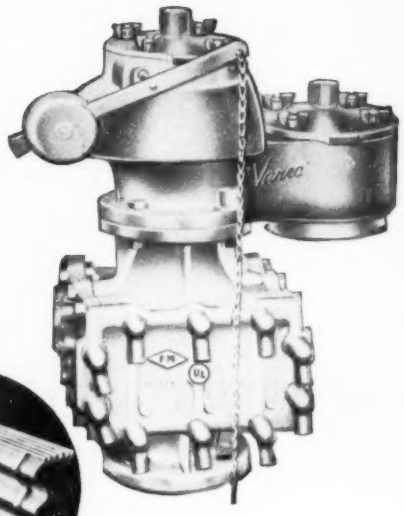

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is doubtful that imports can be maintained at this level. As a matter of fact, they may be cut off entirely.

Coal hydrogenation as a source of benzene has also been the subject of much study and discussion. It has been estimated that two plants for the production of synthetic fuels would produce over 30 million gallons of benzene yearly as one of the products. In addition to other economic drawbacks, the initial cost of the two plants is reported to be about $325,000,000. Moreover, construction would take from 2 to 3 years and would utilize large quantities of materials which should be allocated to industries with proven ability to produce benzene. In contrast, construction to produce this quantity of benzene from naphthenic petroleum stocks would be on the order of only $33,000,000 and construction could be completed in about a year. It does not seem rational to attempt to meet benzene requirements by coal hydrogenation.

Assuming maximum production from other sources, about 70 million gallons of petroleum-derived benzene will be needed in 1952 to satisfy total demands of 307 million gallons. Although present production by the petroleum industry is at the rate of only 12 million gallons per year, a number of new plants are either in the design or construction stage. Certificates of necessity have been granted for plants totaling 30.5 million gallons capacity (as of March 24). The oil industry has also applied for certificates of necessity to build additional plants which would increase benzene production by at least 30 million gallons per year. If construction is allowed to proceed, the additional capacity would raise the production from petroleum to over 72 million gallons per year. If predicted amounts are available from other sources, production should reach a rate of 312 million gallons during 1952 as shown in Table 3.

Within the next 5 years, however, at least 100 million gallons additional capacity will be needed, and, in case imports fall off, about 50 million gallons more. The increased interest of the petroleum industry in producing benzene indicates that these requirements will be met.

TABLE 3—BENZENE CAPACITY, PROJECTED FOR 1952

(Millions of gallons per year)

Source—	Production
Petroleum*	
Present	12
Projected (approved)	30.5
Projected (applied for)	30
Total	72.5
Coke ovens†	
Present	170
Projected increased capacity	10
Projected increased recovery	10
Total	190
Imports	50
Grand total	312.5

*Chem. Ind. Week 68, No. 10, 13 (1951).

†Data presented by L. A. Schlueter before the Synthetic Chemicals Association on March 15, 1951.

At present benzene is being derived from petroleum by adaptations of the Hydroforming process which was used during World War II for producing nitration-grade toluene. In the interim since World War II, a number of Hydroformers have been used for upgrading low-octane gasoline, and more of these units could be converted to benzene production. Another process, in which two stages of processing are used, is being operated by Shell Oil Co. In the first stage methylcyclopentane derived from natural or straightrun-gasoline fractions is catalytically isomerized to cyclohexane. The isomerization product plus additional cyclohexanes present in the gasoline fractions are then subjected to dehydrogenation over a second catalyst.

New Cat Reforming Processes

Recently new catalytic reforming processes and new catalysts have been developed. They will be utilized increasingly in the new plants being constructed. One of these processes, called Platforming, is already in commercial operation for upgrading gasolines, and other units are now in the planning, design, or construction stage for the production of benzene. Plant operation specifically carried out for the production of aromatics has shown that the process is particularly well suited for that purpose.

The most suitable stock for benzene production in Platforming operations is the fraction containing mainly C_6 hydrocarbons from a highly naphthenic gasoline. This fraction contains large percentages of methylcyclopentane and cyclohexane which are converted in one stage to benzene in contrast to some other processes which require two stages. The yield of benzene from C_6 naphthenes in a single pass is 80 per cent of the theoretical and may be increased by recycling.

The U.O.P. Platforming process utilizes a catalyst containing platinum. It is a continuous process inasmuch as periodic regeneration of the catalyst is not necessary. The principal reactions which occur are dehydrogenation, hydrocracking, isomerization, and desulfurization. The small percentages of benzene already present in charging stocks go through the process without change. Aromatics result from the dehydrogenation and isomerization-dehydrogenation of naphthenes. Only minor quantities of aromatics are produced through dehydrocyclization of paraffin hydrocarbons. The hydrocracking reaction is essentially a simultaneous cracking-isomerization-hydrogenation reaction of paraffins. For example, n-decane produces n-pentane and isopentane, butanes and hexanes, and propane and heptanes. This reaction also takes place to some extent with naphthenes but can be practically eliminated by controlling conditions. Low pressures favor dehydrogenation to aromatics while high pressures increase the hydrocracking reaction. The flexibility which these reactions permit makes it possible to carry out highly selective operations for the production of aromatics.

The gasoline fractions used in Platforming always contain paraffins in addition to the naphthenes, the relative percentages varying with the specific crude-oil source. Consequently, gasoline is produced along with aromatics. Under the conditions used for aromatic production, the paraffins undergo isomerization to more highly branched compounds with the result that gasoline of improved octane number is obtained along with the aromatics. This point is of high importance in the over-all economics of aromatic production.

The quantities of benzene potentially available from petroleum are tremendous. In estimating these amounts, production of 2,300,000,000 bbl. of crude oil for 1951 in the United States is used. Data obtained from Platforming operations indicate that the potential quantity of benzene available from the 1951 crude-oil production is 825 million gallons.

A discussion of the production of benzene from petroleum would not be complete without some mention of toluene and the C_8 aromatics. These compounds are produced by the same processes as benzene and in much larger quantities. Their importance in our economic picture is also great. Toluene, as a basic material for TNT and as an aviation-gasoline component, is of particular significance in our mobilization program, and, in case of war, will be needed in far greater quantities. The C_8 aromatics, which include o, m, and p-xylene and ethylbenzene, are becoming increasingly important chemical intermediates. Phthalic anhydride, which was once produced entirely from naphthalene, has also been derived from o-xylene for several years. An increase in capacity of petroleum-derived phthalic anhydride is highly desirable because of the naphthalene shortage. The m-xylene is of importance as an aviation gasoline component and experimental studies show that it will have high value as a chemical intermediate.

The new synthetic fiber, Dacron, is derived from terephthalic acid which is an oxidation product of p-xylene. Projected facilities for the

TABLE 4—AROMATICS FROM PLATFORMING, ESTIMATED YIELDS BASED ON 1951 CRUDE-OIL PRODUCTION

	Million gallons
Benzene	825
Toluene	1,650
o-xylene	500
m-xylene	1,100
p-xylene	500
Ethylbenzene	375

TABLE 5—AROMATICS FROM U. S. NATURAL GASOLINES, ESTIMATED YIELDS FROM PLATFORMING, 1951

	Million gallons
Benzene	120
Toluene	230
C_8 aromatics	85

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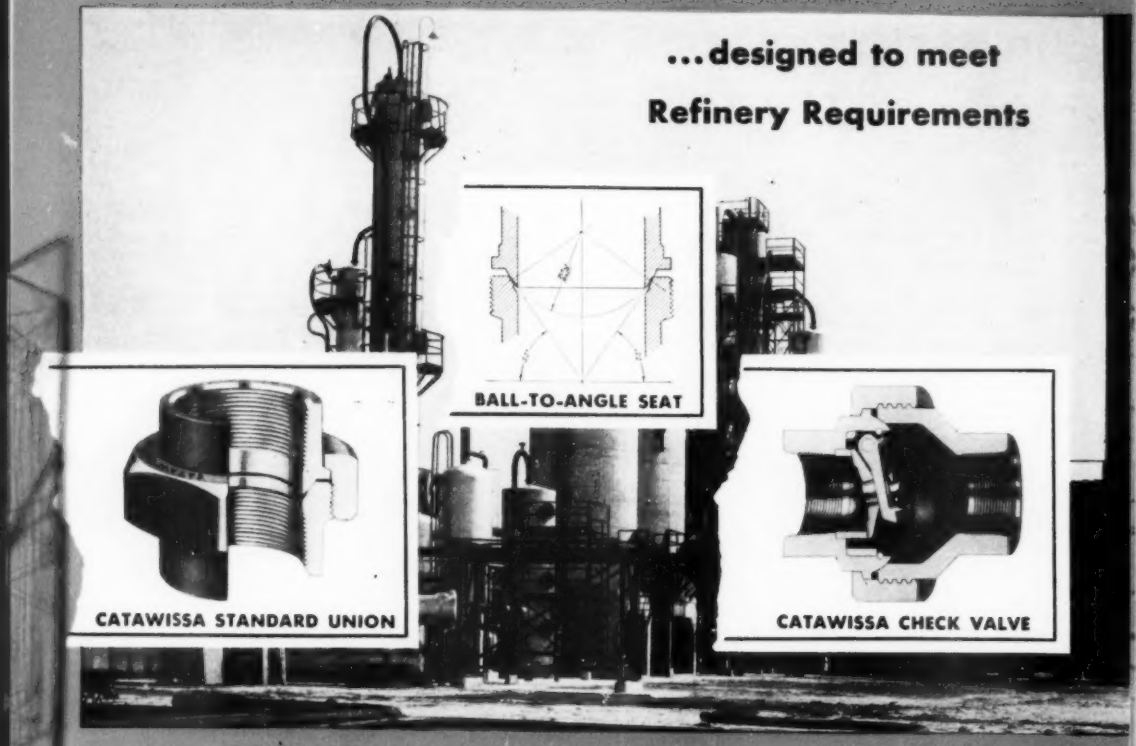

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TABLE 6—SUMMARY, AROMATICS FROM PLATFORMING, 1951 BASIS

	Total yields, million gallons— Benzene	Toluene	C_8 Aromatics
Platforming straightrun gasoline	825	1,650	2,475
Platforming natural gasoline	120	230	85
Total	945	1,880	2,560

TABLE 7—SUMMARY, AROMATICS FROM PLATFORMING, 1955 BASIS

	Total yields, million gallons— Benzene	Toluene	C_8 Aromatics
Platforming straightrun gasolines	1,100	2,200	3,300
Platforming natural gasolines	165	315	115
Total	1,265	2,515	3,415

manufacture of the new fiber necessitate a great increase in production of p-xylene. Ethylbenzene is the basic material for styrene which accounts for the largest consumption of benzene of any single product. By increasing ethylbenzene production directly from petroleum, the benzene shortage can be somewhat alleviated.

The quantities of toluene and C_8 aromatics available from United States crude oil by Platforming are roughly two and three times, respectively, that of benzene. A summary of the quantities of C_6, C_7, and C_8 aromatics potentially available from estimated crude oil production in 1951 is given in Table 4.

Platforming of the C_6, C_7, and C_8 fractions of natural gasolines (from natural gas) also yields aromatic hydrocarbons. On a basis of normal conversion, the potential yields of aromatics from United States natural gasolines on a basis of an estimated 1951 production of 110 million barrels are given in Table 5.

Table 6 gives a summary of the yields of benzene, toluene, and C_8 aromatics which could be expected from use of Platforming both straightrun and natural gasolines.

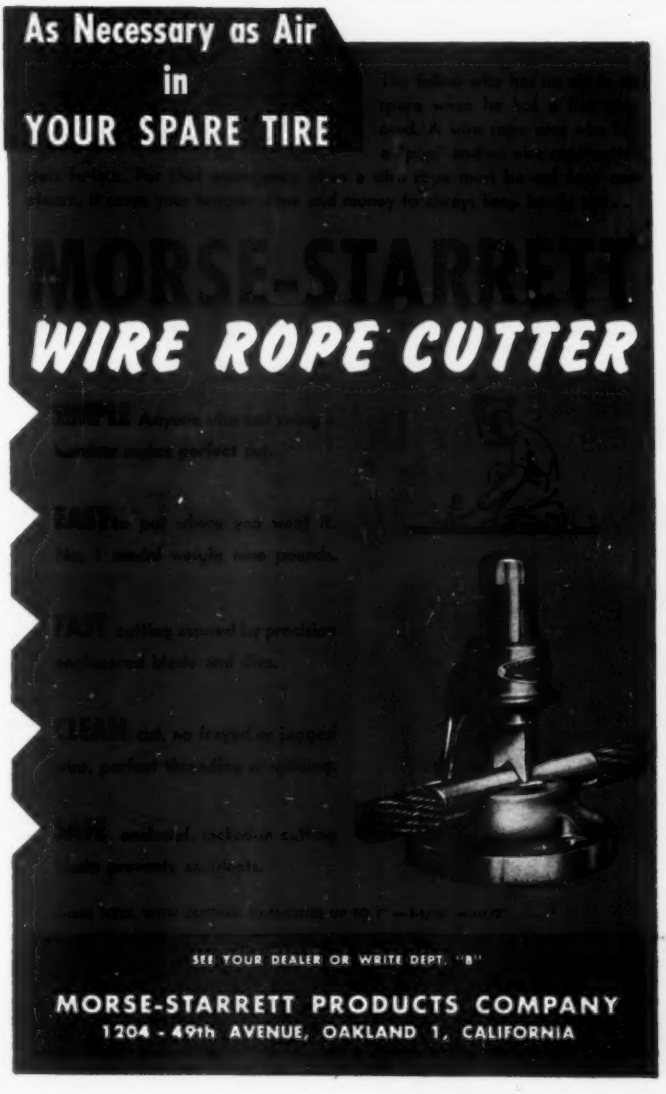
Assuming for 1955 a total production of 3.1 billion barrels of crude oil and 150 million barrels of natural gasoline, an increase of about 50 per cent over 1950 in each case, the potential quantities of aromatic hydrocarbons available are summarized in Table 7.

Expansion of benzene production in the immediate future will come mainly from the processing of natural and straightrun gasolines. Although the production of the required amounts of aromatics will require substantial plant construction, the petroleum industry has the ability to go ahead. It has the technical know-how and the experience to carry out all necessary expansion at a rapid rate. If given proper encouragement and cooperation, the oil industry will produce any aromatic hydrocarbon demands in the foreseeable future.

BOOKS

PRINCIPLES OF PETROLEUM GEOLOGY. By William L. Russell. Texas Agricultural and Mechanical College. Published by McGraw-Hill Book Co., Inc. 508 pp. $7.

Emphasizing subjects and data relating to finding oil and gas, this advanced textbook and reference volume gives up-to-date treatment of the processes, techniques, and basic principles of various branches of geology peculiar to petroleum geology. Petroleum engineering and paleontology have been omitted entirely and the treatment of structure and stratigraphy is brief and rather elementary so as to provide space for thorough and detailed discussions of the principles of petroleum geology itself. Long, detailed descriptions of oil fields and their stratigraphy have been avoided. Subjects treated include the origin and accumulation of oil, important structures, classification of traps, stratigraphic features such as reefs, a nonmathematical treatment of what a geologist should know about geophysics, and the various well-logging methods. Characteristics of oil and gas fields which would aid in locating others have been emphasized. Controversial subjects have not been presented by merely summarizing published arguments on both sides but reconciliation of the arguments and expression of positive conclusions have been made wherever possible. Ideas and principles have been criticized and appraised as well as described. Illustrations for this text have been aptly chosen.



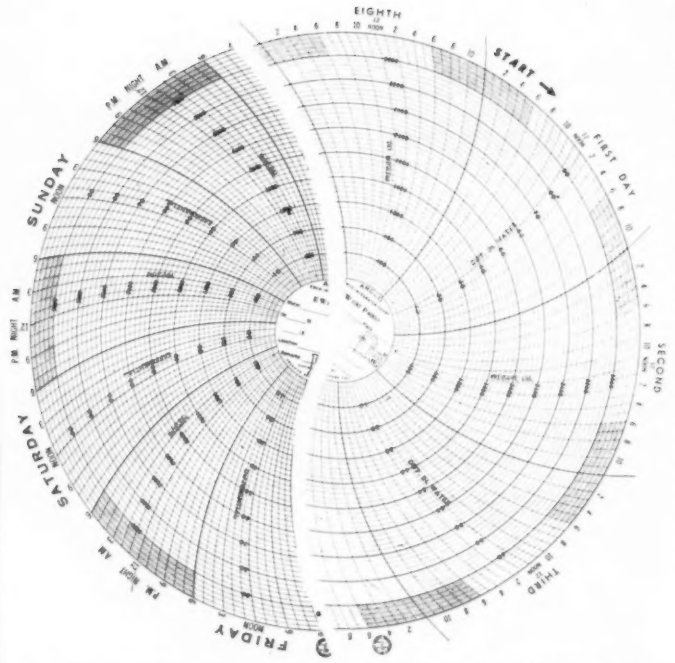
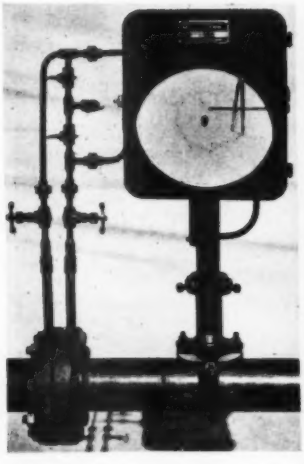
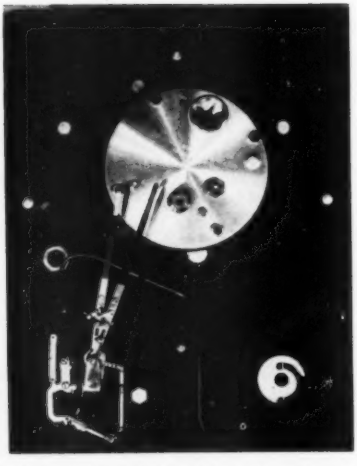


Fig. 1—Comparison of new 8-day chart for recording orifice meters (right), with standard 7-day chart (left). The chart has an initial starting line and the days are numbered first to eighth.

New 8-Day Orifice-Meter Charts Effect 20 Per Cent Economy





Front view of recording orifice meter and photo of Macnick chart drive, using the new 8-day charts.

MEASUREMENT and control engineers of Phillips Petroleum Co. have initiated a change from use of 7-day orifice-meter charts for measurements of natural gas to 8-day charts. This change reduced the number of charts used per meter each month from five to four, effecting economies of 20 per cent.

Not only do 8-day charts cut down work in the field but their use has enabled accounting-division personnel to improve schedules for volume calculations and billing. By avoiding a partial-time-period chart at the end of each month, as was necessary with the 7-day charts, the accounting division now has a more even distribution of work.

Old standard. — For gas-gathering systems, the 24-hour-period chart was used for many years as a standard with 48-hour charts being employed where dictated by operating conditions and economies. Where circumstances were favorable and to supplement savings possible through a chart utilizing a longer period of rotation, 7-day charts were used in limited numbers in line with standard industry practice. World War II gave further impetus and incentive to the use of the 7-day chart as transportation shortages and restrictions, added to reduction in manpower, made mandatory the use of the charts of longer rotation period.

For several years, Phillips has continued the use of the 7-day charts. Because of the great number of charts used by the firm and the distances traveled each month, the saving brought about by changing to the 8-day charts has been appreciable.

Changeover Problems

Three of the main problems met and solved to make the changeover effective were:

Chart drives.—It was necessary to contact with the various manufacturers of these items since the metering equipment employed several makes. After much study, it was learned that the Macnick Division of Rockwell Manufacturing Co., of Tulsa, could furnish an interchangeable turret-type converter which permitted the present 7-day Rockwell chart drive to be made easily and cheaply into an 8-day unit. This meant that Phillips standardized on the use of Rockwell chart drives for this particular purpose.

Charts. — Here the problem concerned design and printing, after solving those incident to the manufacture of an 8-day drive. Several types of 8-day charts were tried. The one selected is shown in Fig. 1. This chart has an initial starting line and the days are numbered first to eighth. It was no longer practical to name the days of the week as was ordinarily done on the standard 7-day chart. The chart is synchronized with the starting mark at its edge and the

(Continued on page 110)

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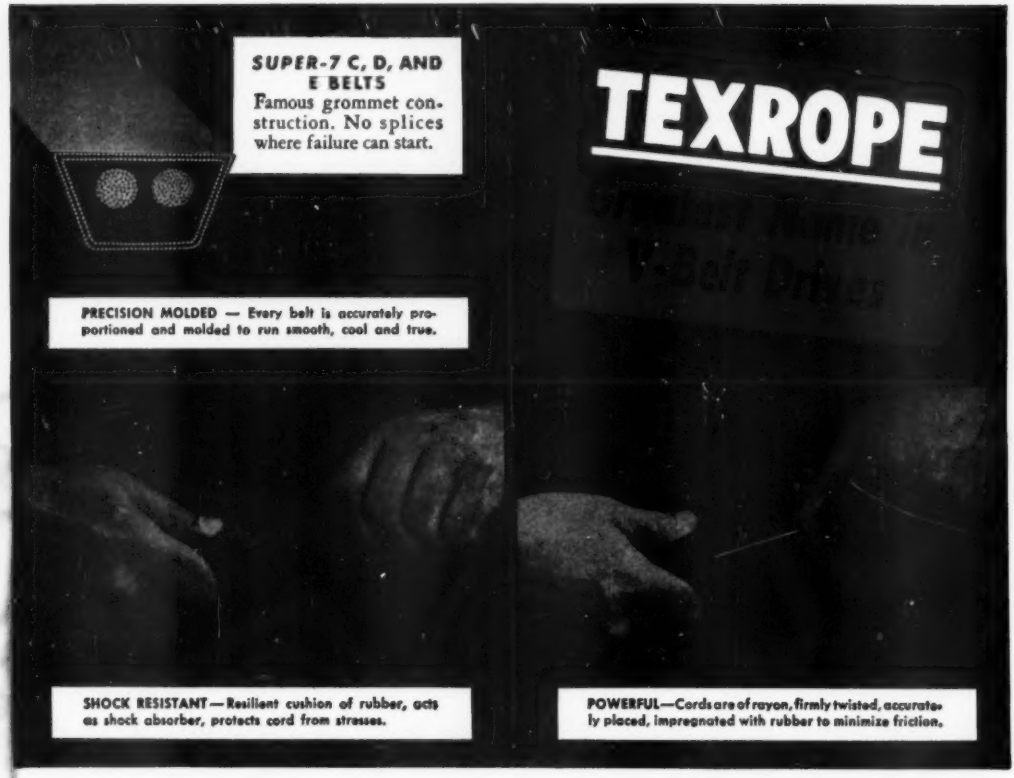
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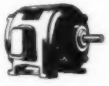

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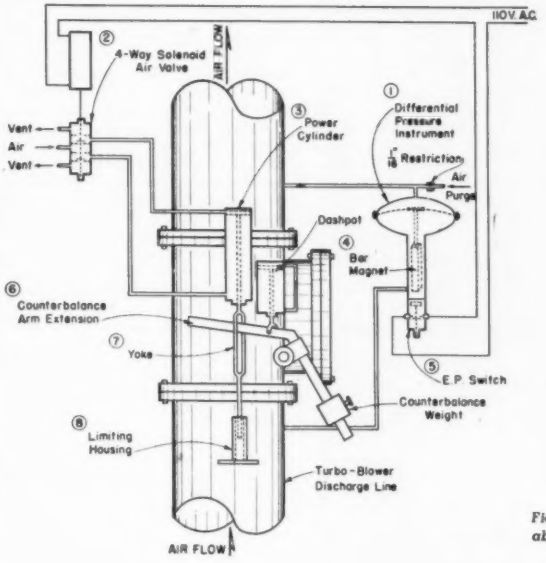

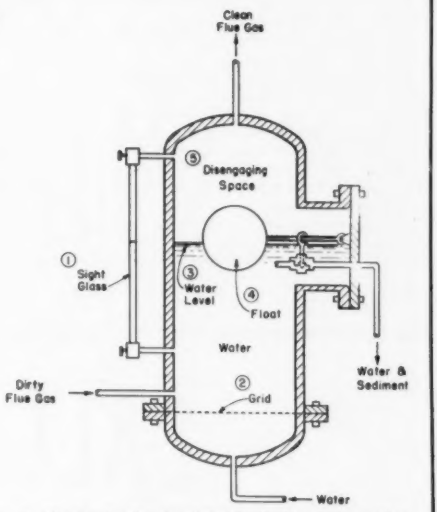

Fig. 1—Check-valve booster, left. Fig. 2—Flue-gas scrubber, above. (Courtesy Deep Rock Oil Corp. manufacturing and research division.)

Here's how Deep Rock went about

Solving Catalytic Cracking Unit Problems

by Jon Beam*

UNUSUALLY trouble-free operation of the new fluid catalytic cracking unit put on stream at Deep Rock Oil Corp.'s Cushing, Okla., refinery, in July 1950, has been achieved by employing some pre-startup innovations. Two outstanding items which contribute substantially to continuous operation of the cat unit are described here along with an unusual and inexpensive communication system.

Check Valve Booster

One item of concern in fluid cat cracker operation is proper response of the large weight-loaded check valve in the turbo-blower discharge line. This check valve must be heavily counterbalanced to reduce pressure drop, and it also stays in the open position for long periods of time. After remaining in one position for an extended period, the valve-shaft bearings tend to stick to such a degree that the counterbalance is insufficient to close the vane in case of blower failure.

Previous attempts have been made to solve this problem by employing various boosters and by pivoting the dashpot. *(See article in The Oil and Gas Journal, December 28, 1950, page 56).* Some types of boosters, however, render the check valve inoperative in case of electric current or instrument air failures. While pivoting the dashpot decreases the friction somewhat, it does not always insure positive operation.

Plant engineers at Cushing decided a check-valve booster which would receive its operation impulse from the pressure drop across the vane was needed. This idea presented two problems: (1) design of the booster so that it would not interfere with normal operation of the check valve, and (2) limitation of its stroke to a short blow having sufficient power to break loose the stuck vane shaft and yet not force the vane completely shut. Closing the check valve would upset operation of the unit if the booster should operate the wrong time through mechanical failure or testing.

The booster shown in Fig. 1 was developed and installed shortly after the cracking unit was placed in operation. To date the blower has not failed. However, the new device has responded to weekly tests since startup and so far has required no maintenance work.

The three parts of the booster, shown in Fig. 1 are: (1) the differential pressure instrument which actuates the switch; (2) the four-way solenoid air valve, and (3) the power cylinder. The differential pressure instrument was made by attaching a short section of 1½-in. brass pipe to the diaphragm bonnet of an old control valve. This in turn was fitted with a bar magnet (4) and an explosion-proof switch (5). The four-way solenoid valve operates on 110-volt a.c. and has ½-in. ports. The power cylinder is 3 by 18-in. with a 10-in. maximum stroke.

To install this equipment, a 30-in. section of ½ by 2-in. bar stock (6) is welded to the counterbalance arm to extend its length. Mounting the power cylinder on brackets allowed it to be placed directly above the extended arm. Next a yoke (7) fitted to the power cylinder shaft permits it to ride across the counterbalance arm extension. A guide housing (8) around this yoke limits the stroke of the power cylinder to 6 in. Heavy bosses were welded above and below the check-valve body for connecting the pressure tap lines to the differential-pressure-operated switch.

The top connection is purged with instrument air. The solenoid air valve,

*Mechanical development engineer, Deep Rock Oil Corp.

mounted on a suitable bracket, is wired so that one branch of the electrical circuit passes through the switch in the differential pressure instrument.

The booster operates as follows: With a positive pressure drop across the check valve, the diaphragm in the differential-pressure-operated instrument lifts the bar magnet, and through the gravity switch, breaks the electrical circuit to the solenoid valve. The change in loading pressure to the power cylinder then causes the yoke to move downward, striking the counterbalance arm extension with considerable force, thereby freeing the vane shaft. With a negative pressure drop the procedure is reversed.

Flue-Gas Sample Scrubber

Another problem at the cat cracker involved plugging of the stone filters in the flue-gas sampling system for the oxygen analyzer. Engineers found that catalyst was plugging the filters and getting into the instrument. Answer to the problem was found in the scrubber shown in Fig. 2.

The body of the scrubber is made of a section of 10-in. pipe 30 in. long, which is fitted with a sight glass (1). A grid (2) in which a large number of 1/32-in. holes are drilled was installed in the flanked connection of the lower section. Water continuously supplied to the scrubber is maintained at a predetermined level (3) by means of an internal float-type liquid-level control (4) and drawoff valve. Flue gas is introduced directly above the grid below the surface of the water in the scrubber. The gas passes through the water and disengaging space (5) where it is freed of the entrained catalyst and water resulting from steam condensation, before passing out the top connection to the oxygen analyzer. Constant agitation caused by the jetting action of the water through the grid and the flue gas keep the catalyst in suspension until it is drawn off along with overflow water through the liquid-level control valve.

Actual Orsat checks indicate that the water-scrubber action does not affect the oxygen content of the flue gas in any detectable degree. And during 2 months of operation, the stone filters have never had to be cleaned. The previous method required cleaning of the filters at least three times during each 24-hour period.

Communication System

Surveys of other refineries disclosed that a majority of cracking units lacked a simple, efficient communications system because of the high cost of installing explosionproof telephones and accessory equipment. An answer to this problem was found through the use of war-surplus sound-powered telephones. In addition to providing telephones around the plant and adjacent units, the very low operating voltage forestalls the possibility of sparks and consequent need for shielding.

Although the phones are connected in parallel circuits, reception has been surprisingly clear, more so than conventional telephones, the operators report. The one weakness of the sound-powered phones, the lack of a signal system, was eliminated by installing a separate circuit of explosionproof electric-powered horns and push-button switches. Code calls are used for the different stations and individual operators.

Peening Process Increases Fatigue

(Continued from page 75)

fatigue life of from two to three times. This figure was much more representative of field conditions because, actually, a threaded connection closely approaches the notched sample.

The test shown in Fig. 7 subjected actual drill-collar-type threads to

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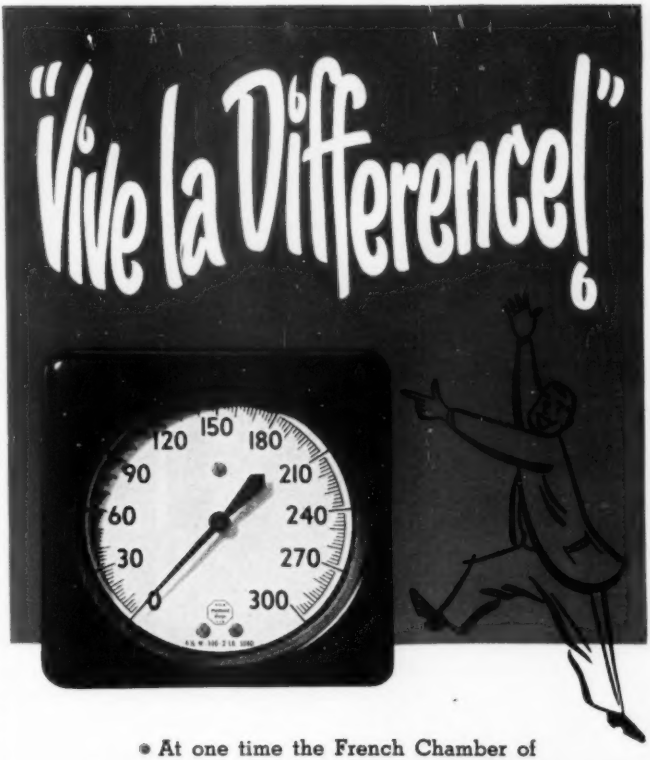
rotational fatigue and indicated that treated threads would have a fatigue life of approximately twice that of untreated threads. This figure has been confirmed by extensive field experience.

There was one more test to be made however. The connections for the drill collars are heated to around 600° F. before application to the drill collar. The question as to what effect this heat would have on the compressive stresses induced by mechanically peening a drill-collar land was answered by the simple test of drawing a group of samples at various temperatures. These tests showed that the loss of compressive stress due to the heat from installing the connection would be less than 15 per cent and would have a negligible effect on fatigue life.

Fig. 8—Diagram showing relative shape of conventional A.P.I. thread root and one which has been Hi-Flexed. Dotted line shows contour of A.P.I. thread root with solid line indicating a peened thread root. Threads are interchangeable.

To insure proper treatment of the thread roots it was desirable to use a slightly modified A.P.I. thread root form. The standard A.P.I. thread form and the modification used for Hi-Flex threads are shown in Fig. 8. The modification consists of slightly dishing out the thread root to assure correct centering of the treating tool. This modification in no way affects the interchangeability of the threads with standard A.P.I. threads.

Early field experience confirmed increased fatigue life of treated connections in the expected manner. The first drill collars sent out to the field were treated on the pin end only, since the pin end was the point of breakage in practically every case. These early test drill collars invariably developed fatigue cracks in the box end threads. This indicated a marked increase in the fatigue life of the pin end threads. When service tests results of the conventional Hi-Flex drill collars with both box and pin end thread treated started coming in, it was found that the fatigue cracks that actually did develop were in the bore back of the box. This bore is now being treated also and it is believed that failures will now start showing up at the pin end threads again, but, of course, after a longer service life for the collars.



• At one time the French Chamber of Deputies was debating women's suffrage. When one liberal soul pointed out that there was very little difference, after all, between the sexes, a fellow deputy leapt to his feet and shouted with gusto, *"Vive la difference!"*

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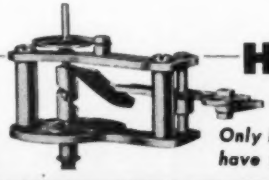

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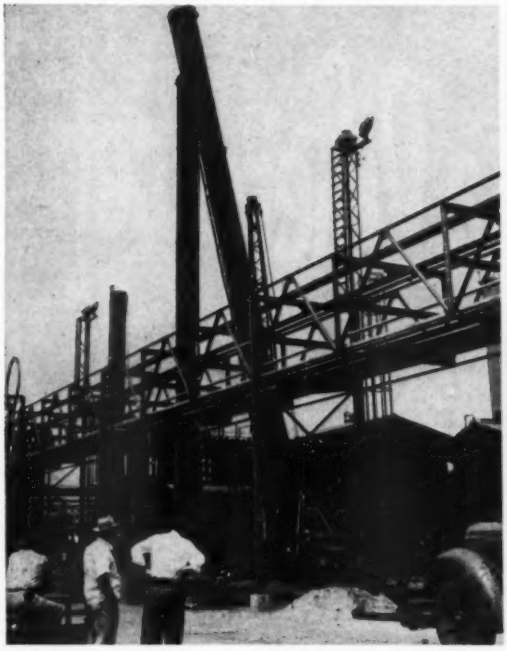
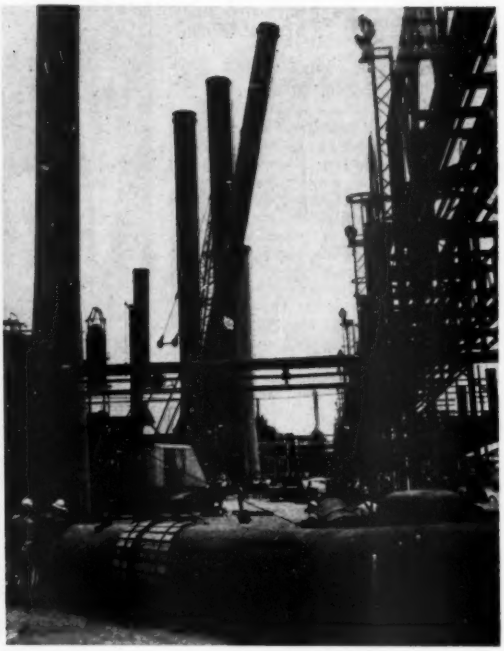
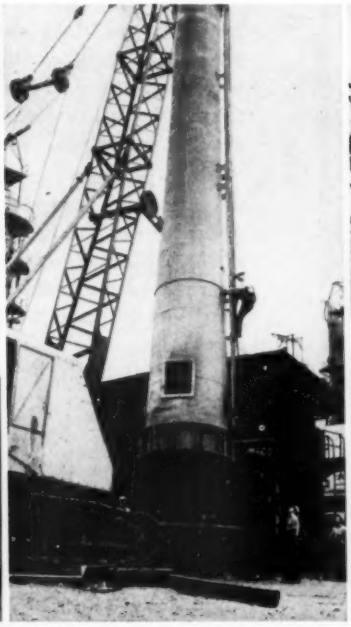


1. Overhead high-pressure pipe lines and nearby equipment complicated the job of removing the original stack and installing a new one in its place.

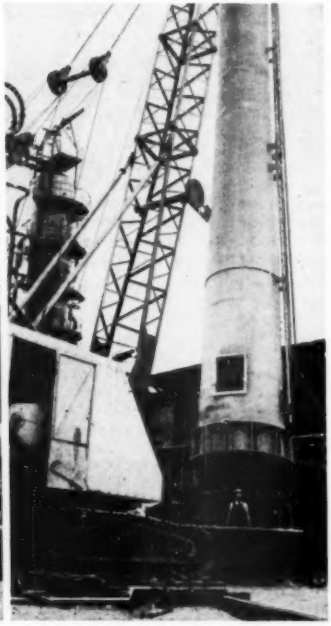


2. Cut into two sections, the original stack was removed from its foundation and placed clear of the job site. It is shown here in the foreground.

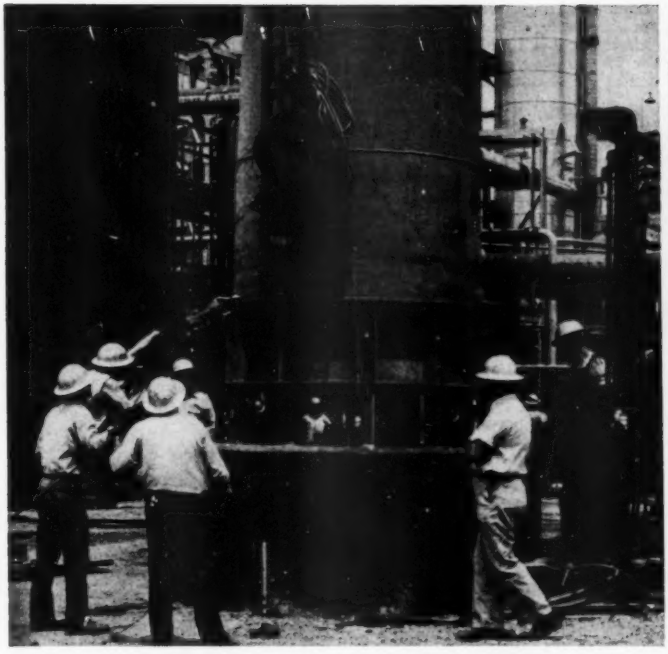
3. At this point of the operation the new stack is being maneuvered into final position over the foundation anchor bolts.



4. Now lined up, the stack is in position to be lowered to its foundation. Manipulation of stay lines keeps the stack plumbed.



5. Suitably aligned over the foundation, the new stack is about to be lowered. Anchor-bolt sleeves prevent damage to threads.



5. Here the new stack is going into position on its foundation. The special sleeves placed over the anchor bolts also aid in guiding the bolts into the anchor ring on the stack.

UNUSUAL REFINERY PROBLEM:

Giant Stacks Changed in 3 Hours—Here's How . . .

FROM 8:30 a.m. to 11:30 a.m. is 3 hours. And that is exactly the length of time it took Shell Oil Co. refinery engineer crews to tear down and rig up a 15-ton, 100-ft. stack on a crude-oil furnace.

The stack is located at one of the crude-oil furnaces at Shell's 115,000-bbl. Deer Park refinery, Houston.

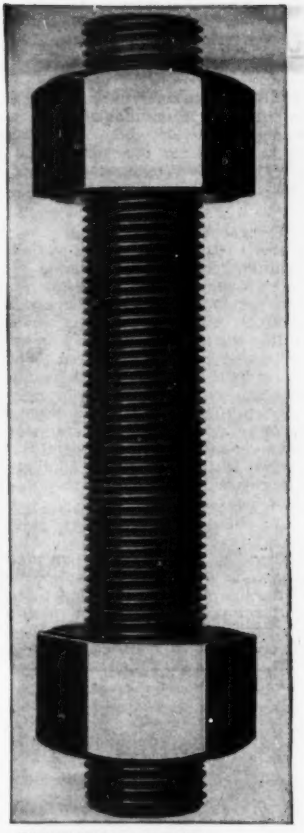
Prior planning plus a few novel engineering twists cut construction time to less than one-third of that consumed on similar jobs.

Ten crew members used a crane, two tractors, one side-boom unit, and two winch trucks to lift, lower, and maneuver the stacks.

Location of the crane, shifted from an originally planned position, allowed dismantling of the old stack and erection of the new one to proceed concurrently. The crane was able to lift and lower the stack without endangering existing lines, and then place it parallel to, but offset from, the new stack. The crane was then used immediately to rig up the new stack. While this was taking place, the old stack was cut in two and hauled off the job site. Original location of the crane would have required a delay until the old stack was removed.

The second major time saver was in the installation of the ladder. Original plans called for a team of welders to shift the ladder from the old stack to the new while both were on the ground. The ladder was removed from the old stack and installed prior to tearing down operations, thus eliminating delay in the over-all job.

In maneuvering a heavy piece of equipment onto a foundation which contains anchor bolts, damage to the bolt threads is always a problem. Shell men made pointed metal sleeves which fitted over the bolts and effectively protected the threads. The sleeves did double duty, acting as guides for placing the new stack.



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REPRESENTATION IN PRINCIPAL CITIES

Gas-Turbine Centrifugal Compressor Stations

(Continued from page 82)

cluded to run the d.c. pumps for approximately 30 minutes after the unit comes to rest to keep the bearings cool. Restarting can take place at any time after both shafts come to rest.

Control

The gas turbine will usually be operated so that the speed is varied to maintain compressor discharge pressure. Maximum exhaust temperature and maximum speed are overriding controls. A selector switch is provided so that the unit can be placed on manual speed control if desired. Where more than one turbine is installed in a station, it is expected to operate only one unit on automatic discharge pressure control with the remaining units on manual speed control. The control system is flexible so that as experience indicates the actual operation can be changed.

Station Valving

The simplicity of the station piping is possible because the complete flow of the line goes through each centrifugal compressor and for a multiple unit station the compressors are placed in series. The main gas valves are operated from gas line pressure. They are electrically piloted operated, with extreme travel limit switches in order to provide for automatic operation of the station.

Drilling and Completion Practices at Church Buttes

(Continued from page 88)

valves of the christmas trees are fitted with extensions and blowoff lines in case of emergencies at a later date.

Bottom-hole pressures are taken immediately after the wells are cleaned and before being put on production. Also, reservoir pressures are taken yearly on all wells to determine the amount of pressure decline in the reservoir for the amount of gas produced since the preceding survey.

Initial shut-in surface pressures are 5,400 psi., and the flowing pressures vary from 3,000 to 4,500 psi., depending upon the rate of flow. The first reduction in the well-head pressure is taken after the gas travels a short distance and through one side of a two-pass indirect heater. After the gas expands through the adjustable choke, it is again reheated as it travels through the second pass of the heater. It then enters the meter house on the downstream side of the heater. It is necessary to install the heaters near the wells to prevent the formation of hydrates in the flow lines due to the cooling on expansion to the flow-line pressures.

Pressure on the flow lines to the plant is 950 psi., and the hydrate point at this pressure is approximately 64° F. On the longer flow lines it is necessary to install intermediate heaters to prevent the flowing temperatures of the gas from decreasing to this temperature. All flow lines are buried 6 ft. and accurate records are kept of the daily temperatures at critical points to maintain the temperature of the gas above the hydrate temperature.

The gas enters the plant at this pressure, the hydrocarbons and water are removed, and then the gas enters the main line to northern Utah at a pressure of 450 psi.

Orifice-Meter Charts

(Continued from page 102)

date that the chart is put on the meter is marked on the front of the chart. By using this starting date, position of pen may be easily determined at any later date. After complete rotation of the chart, the removal date is marked on the back of the chart along with other pertinent data for volume calculation by office integrator.

Office accounting.—The two steps noted above involve the field personnel, who make the necessary changes to the physical equipment and who operate the meters and change thousands of charts each month. The third step concerns the problems in the accounting division.

Use of the 8-day chart has meant the same 20 per cent saving in the calculating and accounting office as in the field, since four postings per 30 days only are required in place of the five required when standard 7-day charts were used.

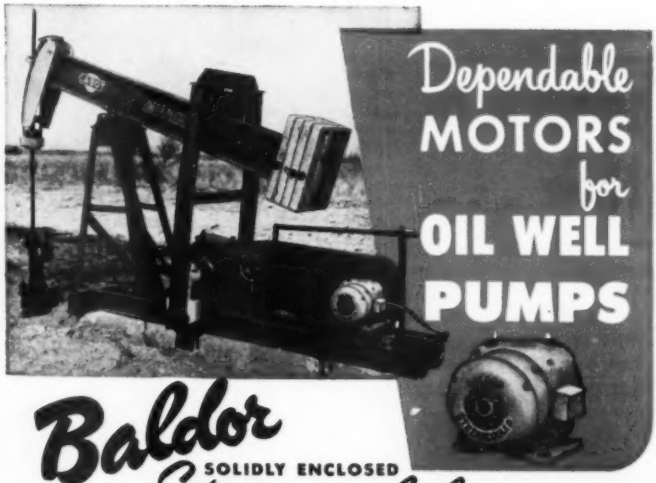
When Phillips made the change from 7-day to 8-day charts, it was decided also to make the change from an "inches differential" chart to a "square root" division chart in order to provide one standard for the field system.

The entire study and program of changeover at Phillips was the joint responsibility of E. S. Moore of the gas department, and G. E. Greiner and J. M. Ribble of the natural-gasoline department.

BOOKS

THE PETROLEUM CHEMICALS INDUSTRY. By Richard Frank Goldstein. Published by John Wiley & Sons, Inc., 440 Fourth Avenue, New York. 449 pp. $8.50.

The primary objective of this book is to survey the fields of industrial chemistry in which oil is the most economic starting material. It covers a wide range of subjects dealing with the manufacture of synthetic organic chemicals from petroleum, especially hydrocarbon gases, and reviews the possibilities and the problems of the industry.



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CORROSION and its control

Coating Inspection in the Field

THE protective coating on a buried line must be depended upon to furnish 90 to 99 per cent of the protection the pipe receives against corrosion. In many instances it is the only protective measure taken, although it is recognized that the best coating is never quite good enough alone. The effectiveness with which a coating performs its intended function is determined partly by the materials used, and partly by the manner in which they are applied. The manner of application, in turn, is determined partly by the written specifications and partly by the care with which these directions are followed.

Although the influence of the inspector comes at the end of this long chain of relationships, since it only partly affects the care with which the process is carried out, it occupies a position which is crucial; failure on the part of the inspector to carry out his duties properly can easily reduce the effectiveness of a coating job from 99 to 90 per cent which means that the pipe surface exposed to corrosive attack is increased tenfold! This can mean either 10 times the amount of corrosion, or 10 times the cost of cathodic protection needed.

Five Phases of Work

Five phases of the contractor's work require the attention of the coating inspector: (1) materials handling and storage, (2) equipment, (3) application techniques, (4) testing and repairing, and (5) handling of coated pipe.

Coating materials must be stored and handled with proper precautions to prevent losses and contamination. Primer and thinner must be protected from evaporation and from water; felt must be protected against the absorption of moisture, particularly by being stacked in the open or on cement floors. Enamel must be cut up on clean surfaces, so as not to accumulate trash, sticks, or dirt and dust.

The equipment supplied by the contractor must be adequate to the purpose; kettles should have ample capacity, so that there will be no incentive to hasten the melting operation unduly; on the other hand, the use of kettles which are too large may lead to the remelting of enamel, which cannot be tolerated. Knives on cleaning machines must be changed as often as required; the same is true of brushes and other parts subject to wear. Belt slings must be used for the handling of coated pipe.

Correct application technique calls for the application of primer only to properly cleaned pipe. Care should be taken that too much pipe is not primed ahead of the coating operation, so that the primer will always be "alive" when the enamel is applied. Enamel temperatures must be controlled within the proper limits, as specified by the manufacturer. Enamel should be stirred in the kettle, to prevent uneven heating and settling out of the filler material. Kettles must be thoroughly cleaned after each batch, to prevent contamination of the next batch with burned enamel. Unmelted enamel should never be added while a kettle is in use, since this makes temperature control virtually impossible.

Wrapping machines must be adjusted so as to secure the desired lap, as called for in the specifications. The tension must be adequate to prevent buckling, but not so great as to occasion tearing. The time interval between the flooding of the pipe with the enamel and the application of the felt must be such as to secure the specified thickness; this can also be regulated by controlling the temperature of the enamel, provided that the range recommended by the manufacturer is observed at all times.

The use of the holiday detector to locate thin spots, skips, and inclusions of foreign matter is strongly recommended, but this device should never be depended upon to perform the inspector's duties. It cannot, for example, tell the difference between correctly and poorly bonded enamel; it cannot even find bare spots, if the wrapping happens to be buckled at that point. It can "see" some things hidden from human eyes, but there are others it cannot.

All defects, whether found by the holiday detector or by other means, must be remedied; recurrent defects should be analyzed and prevented. Small holidays, skid marks, and thin spots should be patched by hand; the correct method involves the removal of a small patch of wrapper, preferably by means of a knife (hammering is likely to give rise to more troubles, by cracking the coating all around the original defect). After the coating is cut away, a small patch is put on with a daubing brush, and sealed with a piece of felt.

Coated pipe is a delicate commodity, and must be handled with care to prevent damage. For this reason, it is best that the pipe be inspected at the last possible moment, after it has received as nearly all the handling as is possible.

Cooperate With the Contractor

The inspector who considers that his job automatically makes him an enemy of the contractor is, in effect, issuing a challenge which is almost certain to be accepted. In a contest of this kind the inspector is so completely outnumbered that he is doomed to be the loser. If, on the other hand, he considers the contractor and himself as being partners in the job of laying a good pipe line, he is far more likely to protect the interests of his employer. It is easier to obtain the abandonment of an improper practice when a better is suggested; it is still easier if the better practice is also less expensive to the contractor. For this reason, it is important that the inspector know a great deal about the process, and not merely have a set of rules to enforce; it is also very important that he possess in large measure the ability to get along with people.

Part 27 of a series by Marshall E. Parker, consulting engineer, Houston.

QUESTIONS on TECHNOLOGY

by W. L. Nelson
Consulting Engineer

Sulfur Content of Distillate Fuel

In the dehydration of vegetables when burning either distillate or diesel fuel in a direct-fired tunnel, we find that fuels containing over 0.2 per cent sulfur do not permit us to meet the sulfite specifications of the dried product. Since dehydration is conducted at widely scattered geographical locations, we would like to know the sulfur content of distillate in various sections of the country. Will you also give us your opinion of the replacement of distillate or diesel fuel by kerosine. Would it be satisfactory? C.L.R.

Although kerosine has a (laboratory) heating value slightly lower than that of distillate or diesel fuel, it would probably generate more useful heat than the fuels you are now using because of its lower boiling range or burning qualities. Likewise, it would generally contain less sulfur and less aromatic hydrocarbons than the distillate fuels. Thus, it would help with respect to the sulfite specification and should burn more cleanly.

The sulfur content of petroleum products cannot be stated accurately for each region of the country because of the great variety of crude oils found in each district. The U. S. Bureau of Mines has made surveys (O. C. Blade, *"Trends in Supply of High-Sulfur Crude Oil in United States," The Oil and Gas Journal, November 29, 1947, page 73, and "Additional Data on Sulfur in Crude Oils," March 31, 1949, page 95)* to determine the sulfur content of the crude oils produced in major areas, as shown in Table 1. It is obvious that oils of quite different sulfur content will be available in each district. Averages are of little value but as a gross picture of the situation, the average sulfur content for each district is approximately (based on a sulfur content of 3.0 per cent for crude oils listed as "over 2 per cent S").

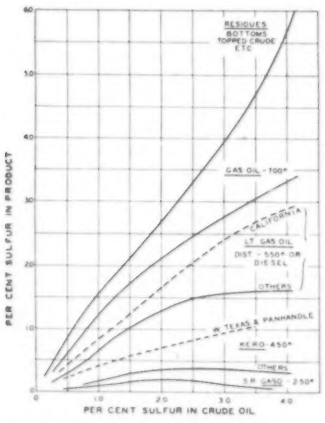


Fig. 1—Sulfur content of products of United States crude oils—approximate unweighted averages.

	% S
California	1.08
Rocky Mountain	1.45
Gulf Coast	0.14
W. Tex. and N. M.	1.47
Mid-Continent	0.64
Ill., Ind., & W. Ky.	0.20
Mich.-Lima	0.57
Southeastern	1.46
Appalachian	0.12

From these figures, it is clear that the favorable areas, as far as sulfur is concerned, are the Gulf Coast, Mid-Continent, Illinois, Michigan (Lima) and Appalachian districts, but it is also apparent that some low-sulfur oil is produced in any of the districts. Unfortunately, some of the low-sulfur products are mixed with products that are high in sulfur.

Sulfur Content of Products

Little definite information can be stated concerning the sulfur content of products because of the great variations in the sulfur distribution in various petroleums. However, Fig. 1 is a gross average of the sulfur content of products as a function of the sulfur content of the crude oil. Space does not permit a detailed description of each of the curves of Fig. 1, but their general accuracy will be discussed in next week's issue. Note that the gasoline curve of Fig. 1 does not include nor does it apply to California, West Texas, or Panhandle crude oils. The accuracy of the curve is usually within 30 per cent but a few crude oils deviate by as much as 100 per cent from the average curves.

It can be seen that a sulfur content of only 0.2 per cent can be obtained only by burning kerosine, or by limiting distillate fuel oils to those that are produced from crude oils that contain only about 0.25 per cent or less sulfur. Even these statements are generalities because there are kerosines that contain more than 0.2 per cent sulfur. Likewise, some 0.25 per cent sulfur crude oils produce distillates that contain more than 0.2 per cent sulfur.

TABLE 1—SULFUR CONTENT OF CRUDE OILS PRODUCED IN VARIOUS AREAS (1947)
(Figures are the percentages based on each district)

District—	0-0.25% S	0.26-0.50% S	0.51-1.0% S	1.01-2.0% S	Over 2% S	Total
California	7.4	21.2	25.2	39.1	7.1	100
Rocky Mountain	19.2		28.3	24.3	28.2	100
Gulf Coast	93.2	6.4	0.4			100
W. Tex. & N. M.	15.4	9.8	8.9	46.7	19.2	100
Mid-Continent	18.7	57.0	9.9	6.8	7.6	100
Ill., Ind. & W. Ky.	68.0	32.0				100
Mich.—Lima	10.4	29.8	59.8			100
Southeastern	24.8		36.9		38.3	100
Appalachian	100.0					100

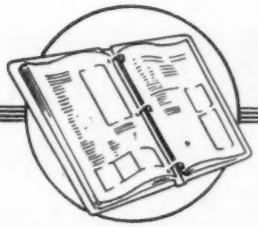
Care of Idle Boiler

Our steam boiler is used only intermittently at periods of 2 to 6 weeks and it seems to corrode badly. How should we protect it?—F. C.

R. B. Conlan of W. H. & L. D. Betz suggests the following "wet method" of caring for such a boiler.

The boiler should be thoroughly cleaned and carefully inspected to insure that all is in good order. After the boiler is filled to the normal water level, the water should be boiled with the boiler properly vented to atmosphere for a short period to expel the dissolved gases released from the water by boiling. The water should then be made alkaline in excess of 400 p.p.m. by the use of caustic soda (approximately 3 lb. of caustic soda per 1,000 gal. of water in the boiler). In addition, sufficient sodium sulfite should be added to the boiler water to produce a minimum residual sulfite content of 100 p.p.m. (approximately 1.5 lb. of sodium sulfite per 1,000 gal. of water in the boiler). After the boiler is cooled somewhat, but before a vacuum is created, the boiler should be filled completely and all connections closed. At weekly intervals, tests of the water should be made and the alkalinity and sulfite concentrations increased if necessary to maintain the recommended concentrations. It is advisable to keep the water in the boiler as cold as possible. For this reason, feed valves and all steam connections should be tight at all times.

If it is necessary for such an idle boiler to be returned to service, the boiler should be blown down well before placing on line in order to reduce the boiler-water alkalinity and prevent carryover.



THE REFINER'S notebook

No. 87

Refractories—Classification

by Ray A. Witschey*

Refractories are often defined as nonmetallic structural materials that have the ability to resist destructive forces at high temperatures. These destructive forces are as diverse as the needs of the engineering world. Temperature is the common denominator in most refractory applications since destructive forces vary (often directly) with temperature.

There is no perfect refractory. Scores of refractory products are produced, each differing from the other in essential respects to meet that diversity of destructive forces imposed by modern furnace technology.

Ultimate success and economy in the use of refractories are predicated on a comprehensive knowledge of refractory materials—their chemical, mineralcgical, and physical properties—their behavior under a wide variety of destructive forces—and the technology of their application. These will be discussed in succeeding installments of The Refiner's Notebook.

THE study of refractories is simplified by arriving at some logical method of classification. Several methods may be employed. In Table 1 a classification is indicated which is based not only on the usual chemical and mineralogical separations but also on a further simplification based on physical form of products.

Classification

Classification by chemical nature is based on chemical or metallurgical behavior. A metallurgical acid is defined as the oxide of a metalloid. The principal acids are silica (SiO_2) and phosphorus pentoxide (P_2O_5). A metallurgical base is defined as the oxide of a metal. The important bases are lime (CaO), magnesia (MgO), and the several oxides of iron.

Just as acids and bases in wet chemistry react to form salts, so acidic and basic refractories react to form compounds called slags.

It becomes at once apparent that the word refractory refers to use or application as much as to material. Environment then defines a refractory. Silica, alumina, and magnesia are excellent refractories, but in other environments may act as potent fluxes. Dolomite is used as a flux in blast furnaces—as a refractory in open hearths. In the same way, dolomite is used as a flux in the conventional cupola but as a refractory in the basic lined cupola which is receiving so much recent attention. It might also be pointed out that in a boiler, carbon is a fuel, but in the modern blast furnace it serves as a refractory.

In using this chemical classification, the writer is not unmindful of recent developments that tend to make these distinctions academic. In this regard reference may be made to use and behavior of the family of spinels, particularly those containing magnesite and chrome, and the still more recent application of acid and basic refractories in combination (zebra construction) in open-hearth steel-furnace arches.

A more conventional classification, which has been termed mineralogical composition, is based on the essential constituent of raw material from which the refractory is manufactured. Such a constituent may be a chemical element (carbon), a compound (silicon carbide), an oxide (silica), or a combination of oxides (zircon or forsterite).

To make this classification more useful, "physical form" is incorporated as a major division in classification of Table 1. In the definition of refractories, one might have been more explicit by referring to refractories as nonmetallic structural materials—"in a variety of physical or commercial forms to make them applicable for use in furnace structures." It should be pointed out that the many mineralogical compositions can be manufactured in a variety of physical or commercial forms to facilitate their application. For example, fire-clay refractories of essentially the same chemical and mineralogical nature may be furnished in the form of brick and tile, mortars, coating materials, castables, plastics, etc.

All these mineralogical compositions, available in so many physical forms, make for a great variety of products. Multiply this by the brand names of numerous manufacturers and it is at once obvious why a logical method of classification is a must.

Chemical and Mineralogical Properties

Chemical composition is of limited value in determining the commercial utility of refractories. Refractories of almost identical composition may differ widely in behavior. Chemical analyses are of value in control of raw materials and products, serve as a basis for classification, and do give an indication of melting behavior. Standard procedures for making chemical analyses have been worked out by the American Society for Testing Materials.

Over 70 per cent of all refractories used are those of the fireclay group. In the interest of clarity, discussion will be confined to this group.

TABLE 1—REFRACTORY CLASSIFICATION

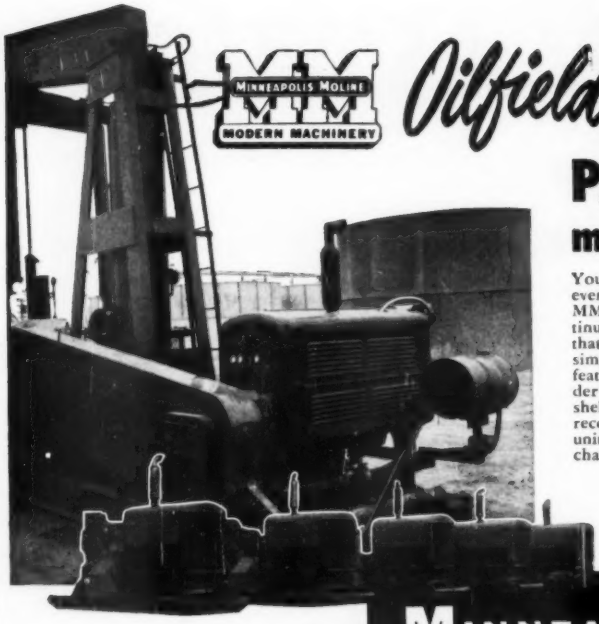
Classification according to Chemical Nature and Mineralogical Composition:

Chemical nature	Mineralogical composition
Acid	Fire clay
	Low-duty
	Intermediate-duty
	High-duty
	Super-duty
	Special super duty
	Alumina-diaspore series
	50% alumina
	60% alumina
	70% alumina
	Kaolin
	High alumina
	Mu'lite
	Zircon
	Silica
	Silicon carbide
Basic	Magnesia
	Forsterite
	Spinel
Neutral	Chrome
	Fused alumina
	Carbon

Classification according to Physical Form:

1. Brick and tile: (a) Refractory (b) Insulating	4. Castables: (a) Refractory (b) Insulating
2. Mortars: (a) Air setting (b) Heat setting	5. Plastics: (a) Heat setting (b) High strength
3. Coatings	6. Ramming mixes

*Ceramic engineer, A. P. Green Fire Brick Co. Portion of paper presented at John Zink Heating Seminar, Tulsa, 1951.



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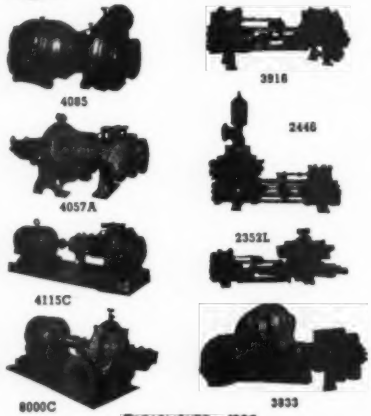

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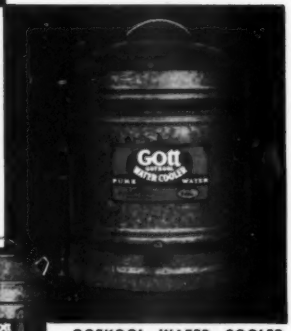

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ENGINEERING fundamentals

No. 458

Effect of Viscosity on Flood Advance

THE calculation of a flood advance assuming that no water moves ahead of the flood front and that the oil and water flow behind the flood front are governed by relative permeability-saturation relationships has been discussed in Engineering Fundamentals No. 457. It was shown that the calculation depends upon the variation of the fraction of water flowing. The quantity is dependent upon the water saturation as given by the formula:

$$f_w = \frac{1}{1 + (k_o/k_w)(\mu_w/\mu_o)} \quad (1)$$

It is noted, however, that for a particular value of water saturation, the value of f_w depends upon the viscosities of oil and water. In particular, as μ_o/μ_w increases, f_w increases for a given water saturation. Fig. 1 is a graph showing the effect of viscosity ratio on the variation of f_w and S_w. The dependence of the fraction of water flowing upon viscosities means that flood front advance also depends upon viscosities.

In the previous discussion it was also pointed out that the saturation, S_{wx}, at the flood front position, x, would be given by the condition:

$$(f_w)_{S_{wx}} = (df/dS_w)_{S_{wx}} S_{wx} \quad (2)$$

As shown in Fig. 1, the change in viscosity ratio has the effect of satisfying Equation 2 at different water saturations. The flood front becomes larger (that is, the water saturation at the flood bank is greater) as the ratio μ_o/μ_w decreases. For a constant water viscosity, the flood bank becomes smaller as the oil viscosity increases.

When the flood front reaches the end of a given linear system of flow, the amount of produced oil will be equal to the amount of water injected, which will be that particular value of Q_t which gives a value of $\Delta x = L$ for the water saturation at the flood front. The relationship between Δx and Q_t for a given saturation is:

$$\Delta x = \frac{Q_t}{\phi A}(df_w/dS_w) \quad (3)$$

Specifically, for that value of Q_t to place the flood front at the end of the flow system, the equation would be:

$$L = \frac{Q_t}{\phi A}(df_w/dS_w)_{S_{wx}} \quad (4)$$

This equation can be used to give the per cent oil recovery at flood breakthrough by observing that this recovery is the produced oil divided by the pore volume of the system, which expression would be $Q_t/\phi AL$. Therefore, a rearrangement of Equation 4 gives:

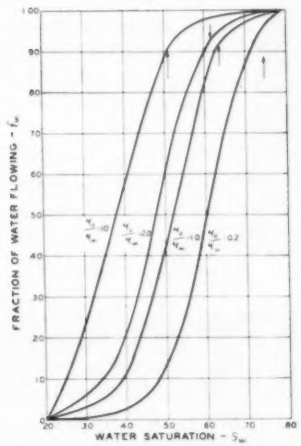
Per cent recovery at breakthrough

$$= Q_t/\phi AL = 100/(df_w/dS_w)_{S_{wx}}$$

$$= 100\, S_{wx}/(f_w)_{S_{wx}} \quad (5)$$

Inasmuch as the saturation at the flood front decreases more rapidly than the value of f_w for the saturation at the flood front (see Fig. 1), when μ_o/μ_w increases, the per cent of recovery at breakthrough decreases. This could be concluded in another way by noting that the value of (df_w/dS_w) at the flood-front saturation increases as μ_o/μ_w increases.

A variation of flood-front saturation and per cent recovery at breakthrough as a function of oil viscosity has been calculated[1] and been found experimentally.[2] Fig. 2 shows the typical variation of recovery at breakthrough as given in Reference 2. The oil which is produced before water breakthrough has been named the initial phase and that produced after breakthrough has been named the subordinate phase.[1]



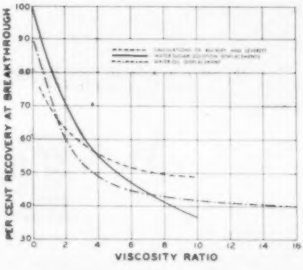


Fig. 1—(Left) Effect of viscosity ratio upon fraction of fluid flowing. Arrows give approximate values of flood-front saturations. Fig. 2—(Below) Comparison of per cents produced by breakthrough.

Nomenclature

- f_w = fraction of water in flowing stream at any point
- k = relative permeability
- μ = viscosity
- S_{wx} = water saturation at flood front
- x = position of the flood front
- Δx = distance from its original position that any value of water saturation has moved
- Q_t = cumulative water injected to move a saturation the distance x
- L = total length of the linear system to be flooded
- A = cross-sectional area of the system to be flooded
- ϕ = porosity
- o = subscript denoting oil
- w = subscript denoting water

References

1. Buckley and Leverett, Mechanism of Fluid Displacement in Sands, A.I.M.E. Trans. Vol. 146, 1942.

2. Everett et al, Liquid-Liquid Displacement in Porous Media as Affected by Liquid-Liquid Viscosity Ratio and Liquid-Liquid Miscibility, A.I.M.E. Trans. Vol. 189, 1950.

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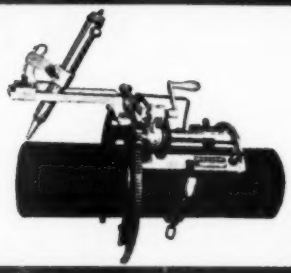
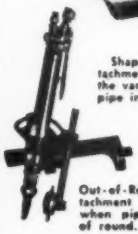


ATTACHMENTS

Shape Cutting Attachment for cutting the various shapes of pipe intersections.



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Pipe-Line Construction

FOLLOWING is a tabulation of pipeline projects which are planned or under construction. Included are crude-oil, products, and natural-gas lines. This list is compiled from surveys made by The Oil and Gas Journal.

Crude-Oil Pipe Lines

Alberta-Vancouver Oil Pipe Line Co. (Brokaw, Dixon, McKee).—972 miles, 16-in., proposed, Edmonton via Pincher Creek, Alta., Idaho and Washington states to Vancouver, B. C.

Derby Oil Co.—15 miles, 6-in., authorized. Wichita to Bentley, Kans. Completion date 12-51.

Gulf Refining Co.—64 miles, 10-in., under way, Eucutta to Lumberton, Miss. L. E. Farley, Inc., contractor; G. A. Alhman, spreadman at Laurel, Miss. Completion date 9-15-51.

Gulf Refining Co.—87 miles, 14-in., authorized, Lumberton to Mobile. Completion date 1-1-51.

Ohio Oil Co.—117 miles, 22-in., authorized, Sheridan, Ind., to Lima, Ohio

Pan American Pipe Line Co.—27 miles, 26-in., Genoa to Texas City, Tex. Completion date 12-52.

Pan American Pipe Line Co.—40 miles, 14-in., Arden Station in Irion County to Eldorado Station in Schleicher County. 6-52.

Phillips Pipe Line Co.—27 miles 8-in., looping from Borger, Tex., to Yale, Okla.

Phillips Pipe Line Co.—Authorized, Midland, Glasscock, Reagan, and Upton counties.

Platte Pipe Line Co.—1,075 miles, 16-20-in., under way, Worland, Wyo., to Wood River, Ill.

Platte Pipe Line Co.—573 miles, 16-20-in., under way. Winchester, Wyo., to Brule, Neb. R. H. Fulton & Co. (Sections 1, 2, 3, and 4.—Section 1, 126 mi. of 16-in., remainder 20-in.). A. A. Carrigan, spreadman at Casper, Wyo., field office.

Platte Pipe Line Co.—142 miles, 20-in., under way, near Marysville, Kans., to Holdredge, Neb. Bishop & Lock (Section 5); H. LaQuey, spreadman.

Platte Pipe Line Co.—100 miles, 20-in., under way, northern edge of Kansas. Rumsey Bros., contractor of Section 6.

Platte Pipe Line Co.—(Section 7) 274 miles, 20-in., under way, Missouri River to Salisbury; field office, Carrollton, Mo.; O. P. Hiner, spreadman. (Section 8) Salisbury to Mississippi River; field office, Moberly, Mo.; B. C. Hall, spreadman. O. R. Burden, contractor. Completion date 9-51.

Progress Pacific Pipe Line Co.—900 miles, 20-in., proposed, Permian basin, West Texas, to California.

Rancho Pipe Line System.—464 miles, 24-in., authorized, McCamey to Houston, Tex. Company crews. Completion date 1952. (Joint project with Sinclair Pipe Line Co., Pan American Pipe Line Co., Tidewater Pipe Line Co., Nantucket Pipe Line Co., and Phillips Pipe Line Co., with Shell Pipe Line Corp. handling construction and operation.)

Rancho Pipe Line System.—66 miles, 8-in., authorized, Gohlke to La Grange, Tex. Company crews. Completion date 1952.

Roosevelt Oil & Refining Corp.—22 miles, 4- and 6-in., authorized, St. Helens to Norwich, Mich.

Service Pipe Line Co.—130 miles, 8-10-in., planned, Old Glory field to Bowie, Tex.

Service Pipe Line Co.—29 miles, 20-in., authorized; Drumright, Okla., to Humboldt, Kans.; 19 miles, 16-in., authorized, Freeman, Mo., to Sugar Creek, Mo.; 63 miles, 10-in., authorized, Cogdell to Old Glory, Tex.; 30 miles, 20-in., authorized, Freeman to La Plata, Mo.; 24 miles, 10-in., authorized, Denton, N. M., to Wasson, Tex.

Sinclair Pipe Line Co.—674 miles, 22-24-in. authorized; Drumright, Okla., to E. Chicago, Ind.

Texas-New Mexico Pipe Line Co.—75 miles, 8-in., planned, Midland to Germania pool; Midland to Scarborough and Sweetie Peck area; and Crane station to McElroy area, West Texas.

Texas-New Mexico Pipe Line Co.—55 miles, 8-in., planned, Eunice to Covington and Saunders area, New Mexico.

Trans-Mountain Oil Pipeline Co. (Sponsored by Bechtel Corp.)—715 miles, under way by July 1951, Edmonton, Alta., via Yellowhead Pass to Vancouver, B. C.

West Texas Gulf Pipe Line Co.—467 miles, 26-in., authorized, Colorado City to Wortham, Tex., 26-in.; Wortham to Sour Lake, Tex., 24-in. Completion date 10-52.

West Texas Gulf Pipe Line Co.—114 miles, 20-in., authorized, Wortham to Longview Tex. Completion date 10-52.

Products Pipe Lines

Bell Oil & Gas Co.—150 miles, 6-in., planned, Ardmore to Drumright, Okla.

Buckeye Pipe Line Co.—430 miles, 14-in., proposed, Linden, N. J., to Allentown, Pa., Junction; Chelsea, Pa., via Allentown Junction to Auburn, Rochester, Syracuse and Oswego, N. Y. Start 1952; finish 1953.

Ohio Oil Co.—24 miles, 8-in., authorized. East St. Louis to Wood River, Ill.

Phillips Petroleum Co.—163 miles, 12-in., looping from Borger, Tex., to Paola, Kans Completion date 11-1-51.

Phillips Petroleum Co.—137 miles, 10-in., looping from Paola, Kans., to East St. Louis Ill. Completion date 11-1-51.

Phillips Petroleum Co.—198 miles, 8-in looping from East St. Louis, Ill., to East Chicago, Ind. Completion date 11-1-51.

Plantation Pipe Line Co.—707 miles, 14 and 18-in., under way, Baton Rouge to Charlotte, N. C., 275 miles, 14-in., under way, Bremen to Charlotte, N. C.; 432 miles, 18-in., under way, Baton Rouge to Bremen, Ga.; 220 miles, 18-in., Baton Rouge to Mississippi-Alabama state line; Williams Brothers Co. David R. Williams, Jr., project manager.

Plantation Pipe Line Co.—200 miles, 14-in., under way, Winder, Ga., to Charlotte, N. C. Williams Bros., contractor. T. E. Davis, spreadman at Athens, Go. Completion date 10-1-51.

Progress Pacific Pipe Line Co.—900 miles, 10-in., proposed, California to West Texas

Salt Lake Pipe Line Co.—Proposed, Pasco Wash., to Puget Sound.

Sinclair Pipe Line Co.—8-in., proposed, Sinclair, Wyo., to Salt Lake City, Utah; 10-in., Houston to Baton Rouge; 16-in., Kalamazoo to Detroit; 20-in. Marcus Hook to Bayonne, N. J.; East Chicago to South Bend, Ind.

Standard Oil Co. (Ind.).—144 miles, 8-in under way by early fall, Neodesha, Kans. to Sugar Creek, Mo.

Standard Oil Co. (Ohio).—17 miles, 6-in., authorized, Toledo to West Toledo, Ohio.

Tuscarora Oil Co., Ltd.—61 miles, 10-in authorized, Knappenberger to Midland, Pa

Natural-Gas Pipe Lines

Algonquin Gas Transmission Co.—27[illegible] miles, proposed, Greenwich, Conn., t[illegible] Boston area; 492 miles, proposed, laterals New England area.

Amere Gas Utilities Co.—11 miles, 8-in authorized KA-5 loop, Priceton and Athens W. Va. Completion date December 1951.

Amere Gas Utilities Co.—16 miles, 8⅝-in., proposed, loops from Mercer County to Princeton, W. Va.

Amere Gas Utilities Co.—15 miles, 8⅝-in., proposed, near Dameron to Flat Top, W. Va

Associated Natural Gas Co.—88 miles planned, Missouri.

Associated Natural Gas Co.—14 miles, 6-in., under way, Sikeston to Charleston, Mo.

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Carolina Natural Gas Corp.—185 miles 3-12-in., proposed, lateral lines off Transcontinental in North and South Carolina.

Central Kentucky Natural Gas Co.—12 miles, 20-in., contemplated, loops Means, Ky., to Foster, Ky. Completion date 10-15-51; 7 miles, 12¾-in., Winchester to Middletown, Ky., Davis & Armentrout Construction Co. Completion date 12-51.

Cities of Booneville and Baldwin, Miss.—**90 miles, 8¼ and 6-in., under way, Booneville and Baldwin, Miss.; M. L. Hulcher Co. Inc., contractor, Sam Carnahan, spreadman Completion date November 1, 1951.**

Cities Service Gas Co.—177 miles, 4-30-in., under way, Grant, Stanton, Hamilton, Kearny, and Finney counties, Kansas. Vaughn & Taylor Construction Co., Inc. Completion date 11-15-51.

Cities Service Co.—80 miles, 4-22-in., under way, Grant, Haskell, and Seward counties, Kansas. Cheek Construction Co. Completion date 12-1-51.

Cities Service Co.—10 miles, 26-in., authorized, Ottawa to Princeton, Kans. Completion date 9-25-51.

Cities Service Co.—16 miles, 10-in., under way, Montgomery and Labette counties, Kansas. Completion 9-15-51.

Cities Service Gas Co.—179 miles, 4-30 in., gathering system in vicinity of Ulysses Kans. Vaughn & Taylor Const. Co., Inc. D. D. Vaughn, spreadman, Ulysses.

Coast Counties Gas & Electric Co.—40 miles, 3, 4, and 8-in., planned, Coast and Valley region, California.

Colorado Interstate Gas Co.—250 miles, 20-in., under way, Kit Carson, Colo., to Amarillo, Tex. R. H. Fulton & Co., contractor. Jerry Nash, spreadman at Lamar, Colo.

Commonwealth Natural Gas Corp.—55 miles, 20-in., proposed, West Bend, Ky., to Norfolk, Va.

Consolidated Gas Utilities Corp.—24 miles, 10¾-in., authorized, Marlow field to Fort Sill, Okla. Completion date 12-1-51.

Dow Chemical Co.—70 miles, various sizes, Midland, Saginaw, and Bay City, Mich.; Mahoney Contracting Co., contractor, Ralph Bucher, spreadman at Midland.

East Ohio Gas Co.—65 miles, 26-in., under way, near Petersburg to Cleveland, Ohio. Williams Bros., contractor. Completion date 12-1-51.

East Tennessee Natural Gas Co.—172 miles 22-in., proposed, Greenbrier to Oak Ridge Tenn.

East Tennessee Natural Gas Co.—100 miles, 16-in. proposed, Knoxville to Kingsport, Tenn.

Egyptian Natural Gas Co.—80 miles, 6-8 in., authorized, Norris City to Salem-Centralia, Ill., area.

El Paso Natural Gas Co.—122.9 miles, 30 in., proposed, looping along main line in Texas, New Mexico, Arizona.

El Paso Natural Gas Co.—470 miles, 24-in under way, San Juan basin, New Mexico to Franconia, Ariz. Completion date 10-1-51.

Empire Southern Gas Co.—22 miles, 2-3-4-in., authorized, Ozona, Crockett County, Texas, to Ozona Distribution system.

Equitable Gas Co.—17 miles, 16-in., under way, near Pittsburgh. H. L. Gentry Const. Co., contractor. Lavern Curtis, spreadman at Sewickley, Pa.

Grand Valley Pipe Line Co.—105 miles 8-10-in., planned, Piceance Creek field to Rifle on to Grand Junction, Colo.

Gulf Michigan Transmission Corp.—680 miles, 30-in., proposed, Perryville, La. across Arkansas, Missouri, and Illinois to terminus near St. John, Ind.

Iowa-Illinois Gas & Electric Co.—41 miles, 10-in., proposed, Washington County to Cedar Rapids, Iowa.

Kansas-Nebraska Natural Gas Co., Inc.—60 miles, 8-10-12-in., under way, Grand Island to Albion, Neb.

Kansas-Nebraska Natural Gas Co.—65 miles, 2-8-in., planned, Big Springs field to Ogallala, Neb., and to Ovid, Colo.

Kansas-Nebraska Natural Gas Co., Inc.—39 miles, 4 and 6-in., planned, Neligh to O'Neill, Neb., 54 miles, 4 and 6-in. planned.

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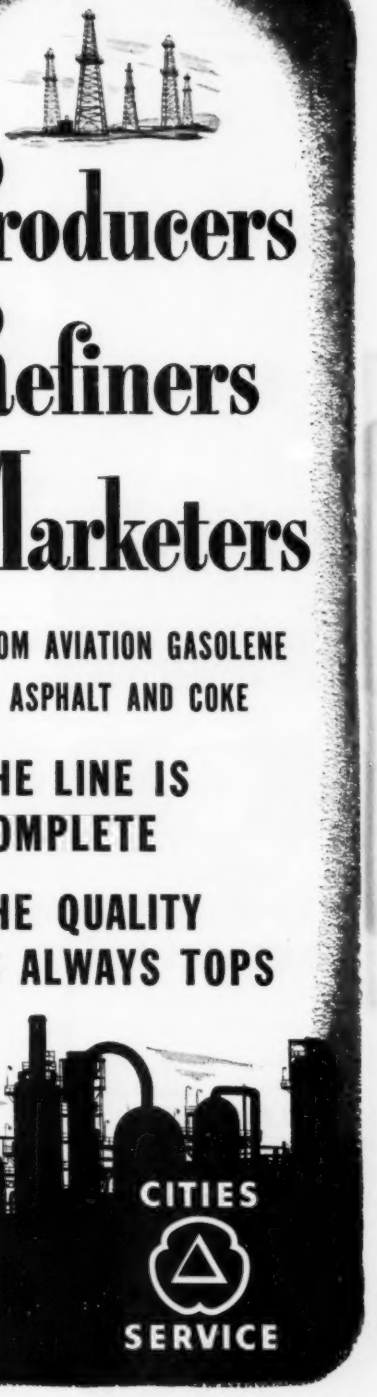

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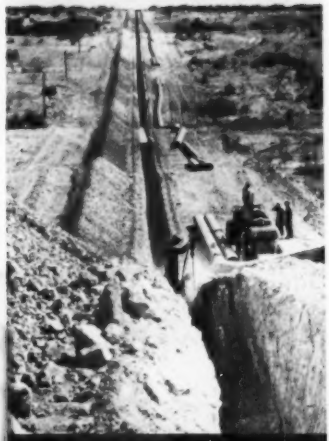

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Kansas Power & Light Co.—27 miles, 20-in., authorized, Pratt, Kans., to Calista compressor station.

Lion Oil Co.—140 miles, 6-30-in., gathering system for Diamond "M" Sharon Ridge refinery. George Tucker Pipe Line Const., contractor. Completion date 10-31-51.

Manufacturers Light & Heat Co.—78 miles, 16-in., contracted, Berwindale, Pa., to near Saltsburg, Pa. Britton Construction Co., contractors.

Michigan Consolidated Gas Co.—131 miles, 24-in., under way, Austin Storage fields to Detroit. Anderson Bros. Corp., contractor. Completion date 11-1-51.

Michigan Gas Storage Co.—94 miles, 8-24-in., authorized, Laingsburg to Mt. Clemens, Mich.

Montana Power Co.—18 miles, 16-in., proposed, Pakowki Lake area to Canada-Montana border.

Montana Power Co.—52 miles, 16-in., proposed, Canada-Montana border to Cut Bank, Mont.

Michigan Consolidated Gas Co.—180 miles, 24-in., planned, Austin, Mich., to Detroit.

Mississippi River Fuel Corp.—98 miles, 16 and 18-in., authorized, feeder line from Lincoln Parish, La., to Waskom field, Harrison County, Texas.

Mississippi River Fuel Corp.—40 miles, 18-in., authorized, Dubach to Perryville, La.

National Utilities Co. of Michigan.—76.7 miles, 20-in., proposed, South Central Michigan. (22 miles from near Marshall south to Coldwater; 20 miles east to Hillsdale; 22 miles southwest to Sturgin; 5 miles from Hillsdale to Jonesville and 6 miles west to Union City.)

Nevada Natural Gas Pipe Line Co.—114 miles, proposed, Topock, Ariz., to Las Vegas, Nev.

New River Gas Co.—50 miles, planned, Summers or Monroe counties, W. Va., to Narrows and Dublin, W. Va.

New York State Natural Gas Corp.—39 miles, 20-in., under way, Potter County, Pennsylvania, to Livingston and Monroe counties, New York. Williams-Austin Co., contractor.

New York State Natural Gas Corp.—26 miles, 20-in., authorized, New Kensington to South Bend, Pa.

New York State Natural Gas Corp.—51 miles, 20-in., authorized, New Kensington, Pa., to Ohio line.

New York State Natural Gas Corp.—27 miles, 16-in. authorized, looping in Greene and Westmoreland counties.

New York State Natural Gas Corp.—70 miles, 20-in., planned, North Oakford, Pa., to Ohio state line.

New York State Natural Gas Corp.—42 miles, 20-in., under way, Murrysville, Pa., to Petersburg, Ohio; 37 miles, 20-in., under way, Lawrenceville, Pa., to Ithaca, N. Y. Field office, Lawrenceville, Pa. Completion date October 1951; 23 miles, 20-in., contracted, state line station to Angelica, N. Y. Office, Wellsville, N. Y. Completion date October 1951; 82½ miles, 20-in., under way, Utica to Ithaca, N. Y. Field office, Clinton, N. Y.; completion date 11-15-51; 85 miles, 16-in., under way by September, Utica to Albany, N. Y. 39 miles, 16-in., under way, Amsterdam to Albany, N. Y., Leman Creech, spreadman at Schenectady, N. Y.; 20 miles, 20-in., under way, Boom Station Tioga County, Pennsylvanian, to Big Flats near Horsehead, N. Y.; Williams-Austin Co., contractor, Ed Peters, over-all general supt.

New York State Natural Gas Co.—77 miles, 20-in., under way, Indiana Pa., to Petersburg, Ohio. Williams Bros., contractor. Clyde Gregory, spreadman at Leechburg, Pa. Completion date 10-31-51.

New York State Natural Gas Co.—23 miles, 16-20-in., contracted. Waynesburg to Colvin Gate, Pa. Pipe Line Const. & Drlg. Co.

New York State Natural Gas Co.—65 miles, 26-in., authorized, Ohio-Pennsylvania state line northwesterly to Summit County, Ohio.

Niagara Mohawk Power Corp.—40 miles, 10-12-16-in., under way, lateral lines at Utica, N. Y.; 55 miles, 10-in., Fulton to Watertown, N. Y.; Williams-Austin Co., contractor, Howard Bauer, supt.

Northeastern Gas Transmission Co.—124 miles, 24-in., under way, New York-Mass. state line to point north of Boston. Oklahoma Contracting Co., contractor. H. A. Wiley, spreadman at Tewksbury, Mass.; M. E. Shiflett, spreadman at Farmington, Mass.; J. E. Flanagan, spreadman at Sturbridge, Mass.

Northeastern Gas Transmission Co.—511 miles 20-24-in., authorized, New Hampshire, Massachusetts, and Connecticut.

Northeastern Gas Co.—411 miles, proposed, New England towns.

Northern Natural Gas Co.—580 miles, proposed, Kansas, Texas, Oklahoma, and Nebraska loops.

Northern Natural Gas Co.—370 miles, 4-26-in., authorized, gathering lines in Hugoton field.

Northern Natural Gas Co.—217 miles, 26-in., under way, Palmyra, Neb., to Skellyville, Tex. G. G. Griffis Const. Co., contractor; field office, Beatrice, Neb.; G. L. Mims, superintendent; E. G. Grisham, spreadman.

Northern Natural Gas Co.—210 miles, 26-in., proposed, five loops in Texas-Oklahoma area, two in Kansas, and two in Nebraska.

Northern Natural Gas Co.—181 miles, 4-12-in., contracted, gathering system in Hugoton area. Reese Bros. Const., contractor.

Northern Indiana Fuel & Light Co.—33 miles, 8-in., proposed, Edgerton to Auburn, Ind.

Northwest Natural Gas Co.—750 miles, planned, Washington, Oregon, and Idaho.

Ohio Fuel Gas Co.—22 miles, 16-in. authorized, Dayton, Troy, Piqua, and Sidney, Ohio.

Ohio Fuel Gas Co.—23 miles, 16-20-in., authorized, Wellington to Elyria, Ohio; 16 miles, 20-in., authorized, Benton Station, to Crawford Station, completion date 11-15-51; 18 miles, 20-in., Crawford Station, to near Columbus, completion date 12-31-51; 16 miles, 16-in., authorized, Berlin Heights to Sandusky, Ohio, completion date 12-31-51.

Ohio Fuel Gas Co.—74 miles, 3 to 30-in., authorized, Hocking, Knox, and Ashland counties, Ohio.

Ohio Fuel Gas Co.—47 miles, 20-in., authorized, Benton Township, Hocking County, to Columbus, Ohio.

Ohio Fuel Gas Co.—61 miles, proposed, northern and southwestern Ohio.

Oklahoma Natural Gas Co.—16 miles, $8\frac{5}{8}$-in., authorized, Shamrock to Cushing, Okla.; 23 miles, 24-in., authorized, Depew to Kellyville, Okla.; 9 miles, $12\frac{3}{4}$-in., Stroud to Depew, Okla.

Oklahoma Natural Gas Co.—40 miles, 16-in., under way, Ninnekah, Okla., to County Line, Okla.; Trojan Construction Co., contractor.

Oklahoma Natural Gas Co.—26 miles, 12-in., authorized, Ringwood to Enid, Okla. Completion date January 1952.

Oklahoma Natural Gas Co.—40 miles, 2-36-in., authorized, Ringwood field gathering system. Completion date January 1952.

Pacific Gas & Electric Co.—44 miles, 8-in., under way, Salinas to King City, Calif.

Pacific Gas and Electric Co.—141 miles, 34-in. proposed parallel sections along Topock-Milpitas line.

Pacific Gas & Electric Co.—10 miles, 10-12-in., authorized, Monterey to Fort Ord to Castroville; 12 miles, 16-in., Napa Wye to Shellville; 6 miles, 12-in., Cotati to Santa Rosa, Calif.

Pacific Northwest Pipe Line Co.—400 miles. 22-in., gathering lines on Texas Gulf Coast to Pacific Northwest pipe line.

Pacific Northwest Gas Pipe Line Corp.—2,175 miles, planned. Wharton County, Texas, via Oklahoma, Kansas, Fort Collins, Colo., to Portland, Ore., Tacoma and Seattle, Wash.

Pan American Gas Co.—40 miles, 16-in., under way, Winnie to Texas City, Tex., Anderson Bros., contractor. Completion date 10-1-51.

Panhandle Eastern Pipe Line Co.—70 miles, 24-26-in., under way, looping from Sneed, Tex., to Emporia, Kans.

Panhandle Eastern Pipe Line Co.—174 miles, 30 and 36-in., contracted, Tuscola, Ill., eastward—looping present system; R. A. Conyes, contractor. 44 miles, 26-in., Edgerton, Mich.; Anderson Bros.: 23 miles, 30-in., looping in Tuscola, Ill.; 45 miles, 30-in.,

looping in Montezuma, Ind.; 63 miles, 30-in., looping in Zionsville, Ind.

Pennsylvania Gas Co.—52 miles, 12-in., between Warren and Erie, Pa. (Sect. 1—27 miles, under way and contracted by Harford Bros. Sect. 2—25 miles.

Peoples Natural Gas Co.—25 miles, proposed, Cambria and Blair counties, Pennsylvania.

Phillips Petroleum Co.—118 miles, 3-22-in., under way, Sherman and Hansford counties, Texas gas-gathering system; Vaughn & Taylor Construction Co., Inc., Dumas Tex., J. F. Crawford, spreadman at Texhoma, Okla.

Piedmont Natural Gas Co.—28 miles, 6-in., proposed, North Carolina—laterals from Transcontinental gas system.

Prince George's Gas Corp.—29 miles, 22-in., authorized, between Chillum and Rockville, Md

Public Service Co. of North Carolina.—33 miles, 10-in., authorized, Burlington to Chapel Hill, N. C., completion date 3-1-52; 16 miles, 8-in., authorized, Chapel Hill to Raleigh, N. C., completion date 7-1-52; 29 miles, 4-in., authorized, Statesville to Kanapolis, N. C., completion date 7-1-52; 83 miles, 8-in., authorized, Kings Mountain to Asheville, N. C., completion date 3-1-53.

Rockland Light & Power Co.—22 miles, 8-in., proposed, Orangetown to Tompkins Cove, N. Y.

Southern California Gas Co.—35 miles, planned, Antelope Valley, California.

Southern California Gas Co.—21 miles, 22-in., under way, Thousand Oaks to Saticoy, Calif. J. E. Young Pipe Line Contractor, Inc.

Southern California Gas Co. and **Southern Counties Gas Co.**—15 miles, 30-in., under way, 104th and Crenshaw to Sunset and Sullivan Canyon. Roy Phillips, spreadman at Paramount, Calif.; completion date 10-15-51; 36 miles, 6-8-in., contracted, Palmdale to Mojave, Calif. Alex Robertson Co., contractor, E. C. Neal, spreadman at Lancaster, Calif., completion date 11-1-51.

Southern California Gas Co., and **Southern Counties Gas Co. of California.**—81 miles, 30-in., proposed, Whitewater to Desert Center, Calif.

Southern California Gas Co.—22 miles, 22-in., under way, Simi to Santa Clara River, Calif. Joe E. Young Pipeline Const. Co., contractor. Completion date 10-51.

Southern California Gas Co.—24 miles, 30-in., under way, Inglewood to San Ferdando Valley, California. Alex Robertson Co., contractor. Completion date 11-51.

Southern Natural Gas Co.—21 miles, 24-in., authorized, Perryville Station, La., to Boeuf River.

Southern Natural Gas Co.—14 miles, 24-in., authorized, Onward Station, Miss., to Big Sunflower River.

Southern Natural Gas Co.—14 miles, 14-in., authorized, Perryville Station, La., to Wilhite Gate.

Southern Natural Gas Co.—375 miles, 24-in., planned, Gwinville, Miss., to Atlanta Ga.

Southern Natural Gas Co.—166 miles, proposed loops, Ouachita Parish, Louisiana, to Augusta, Ga.; 20 miles in Ouachita Parish; 33 miles in Ouachita and West Carroll parishes; 7 miles, Sharkey County, Mississippi; and 106 miles, 14-in., Bass Junction to Augusta, Ga.

Southern Union Gas Co.—15 miles, 20-in., authorized, Albuquerque main line; 18 miles 12¾-in., San Juan County, N. M.; 10 miles, 8⅝-in., authorized, Clovis to Portales, N. M., completion date 12-51.

Southwest Gas Corp., Ltd.—26 miles, proposed, from P. G. & E. line to Victorville, Calif.

Sunray Oil Corp.—133 miles, 3-30-in., under way, system for Snyder gasoline plant, Vaughan & Taylor Construction Co., contractor. D. D. Vaughn, spreadman.

Tennessee Gas Transmission Co.—992 miles, 30-in., planned, first 150 miles of loops to be laid at Monroe, La., Greenville Miss., Midland and Portland, Tenn.

Tennessee Gas Transmission Co.—438 miles, planned, looping on Buffalo and New England extensions.

Tennessee Gas Transmission Co. and **Northeastern Gas Transmission Co.**—175 miles, 24-in., under way, Albany, N. Y., near Wilmington (Boston area), Mass. Oklahoma Contracting Co., contractor, Springfield, Mass., headquarters, Paul R. Halbert manager, H. A. Wylie, spreadman at Pittsfield, Mass., Aldrea Kilgore, spreadman at Westfield, Mass. L. B. Rea, spreadman.

Tennessee Gas Transmission Co.—304 miles, 24-in., proposed, between Mercer, Pa., and Utica, N. Y.; 528 miles, proposed, loops; 200 miles, proposed, miscellaneous lateral lines.

Tennessee Gas Transmission Co.—150 miles, 30-in., under way, vicinity of Jones, La., on the north to near Cypress, Tex., on the south; Houston Contracting Co. Four spreads located as follows: North end work at Bastrop, Tex., W. H. Hayes and M. L. Thompson, superintendents; center section at Natchitoches, La., E. C. Norris and R. E. Thornton, superintendents; south end at Conroe, Tex., F. A. Silar, superintendent.

Tennessee Gas Transmission Co.—64 miles 26 and 30-in., loops, contracted, South Texas. Oklahoma Contracting Co., contractor, field office, Falfurrias, Tex., Panama Shiflett, superintendent.

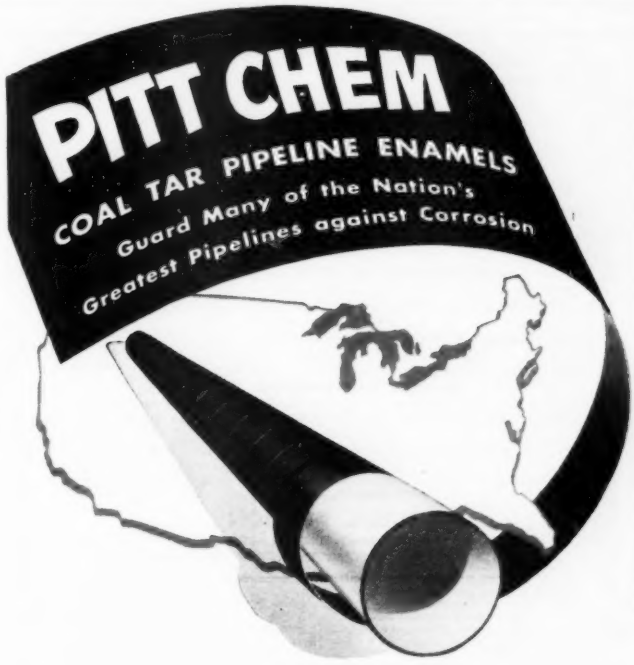
Tennessee Gas Transmission Co.—156 miles 24-in., under way, Hamburg to Onondaga-Madison County line, N. Y.; H. C. Price; Auburn and Warsaw, N. Y., field offices. G. A. Reutzel and R. K. Shivel, spreadmen.

Tennessee Gas Transmission Co.—120 miles, 24-in., under way, Hamburg to Hudson River; Bechtel Constructors, Inc.; Richfield Springs, N. Y., project office, R. L. Bowman and W. N. Molander, superintendents.

Tennessee Gas Transmission Corp.—419 miles, 26-30-in., authorized, loop line along presently authorized system.

The Texas Co.—27 miles, 8-in., authorized, Ventura to Fillmore, Calif.

The Texas Co.—90 miles, 2-24-in., gas-gathering system. Holder Construction Co.,



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Protective Coatings Division
PITTSBURGH
COKE & CHEMICAL CO.
GRANT BUILDING • PITTSBURGH 19, PA.

Charley Andrus, spreadman at Snyder, Tex. Completion date 10-15-51.

Texas Eastern Transmission Corp.—791 miles, 30-in., under way, Koscuisko, Miss., to Connellsville, Pa.

Texas Eastern Transmission Corp.—163 miles, 30-in., under way, Kosciusko, Miss., to Florence, Ala.; Williams Bros.-Davis Co.; **Kosciusko, Miss., field office, G. R. Hamilton, spreadman.** Completion date 10-15-51.

Texas Eastern Transmission Corp.—50 miles, 30-in., under way, Ohio River to Vanceburg, Ky. Trojan Construction Co., Inc., contractor. Charles Tillotson, spreadman at Winchester, Ky.

Texas Eastern Transmission Corp.—76 miles, 30-in., under way, Florence, Ala., to Columbia, Tenn. Eastern Pipeline Contractors, Cliff Simmons, spreadman at Florence, Ala. Completion date 10-31-51.

Texas Eastern Transmission Corp.—79 miles, 30-in., under way, Cumberland River to Columbia, Ky. Oman Construction Co., contractor. William Smith, superintendent and Floyd Hudnell, spreadman at Columbia, Ky.

Texas Eastern Transmission Corp.—80 mile, 30-in., under way, Columbia to Boonesboro, Ky. N. A. Saigh Co., contractor. Hubert Hutchins, spreadman at Campbellsville, Ky. Completion date 10-15-51.

Texas Eastern Transmission Corp.—100 miles, 30-in., under way, Kentucky River to Ohio River in northeastern Kentucky. Mahoney Const. Co., contractor. Henry Mogg, spreadman. Completion date 10-15-51.

Texas Eastern Transmission Corp.—73 miles, under way, Columbia, Tenn. to Cumberland River. H. B. Zachry Co. contractor; A. Vaughn, spreadman at Columbia, Tenn.; completion date 10-15-51.

Texas Gas Transmission Corp.—35 miles, 12-in., authorized, Slaughters, Ky., to Evansville, Ind.

Texas Gas Transmission Corp.—189 miles, 26-in., proposed, Acadia Parish to connection with existing facilities in Morehouse Parish.

Texas Gas Transmission Corp.—195 miles 36-in., proposed, Gulf Coast region to southwestern Louisiana.

Texas Gas Transmission Corp.—425 miles 26-in., proposed, looping from Bastrop, La to Hardinsburg, Ky.

Texas Gas Transmission Corp.—580 miles 26-in., proposed, Louisiana and Kentucky

Texas-Illinois Natural Gas Pipeline Co.—1,300 miles 30-in., under way, Corpus Christ area to Joliet, Ill.

Texas Illinois Natural Gas Pipe Line Corp. 58 miles, 20-in., under way, Joliet, Ill., to Volo Meter Station, Ray L. Smith & Son, Inc., contractor; field office, Aurora, Ill.; R. M. Jones, spreadman.

Texas-Illinois Natural Gas Pipeline Co.—100 miles, 30-in., under way, Mississippi River to Effingham, Ill.; Midwestern Constructors, Inc., contractor of Schedule 11 John Work, superintendent; field office, Vandalia, Ill. Completion date 10-15-51.

Texas-Illinois Gas Pipe Line Corp.—400 miles, 30-in., contracted, Arkansas and Missouri; Bechtel Corp. V. L. Williams, supt. at Little Rock, Ark.

Texas Illinois Natural Gas Pipe Line Co. 106 miles, 30-in., under way, Texas-Arkansas state line to Malvern, Ark. Bechtel Corp., contractor. Completion date 10-15-51.

Texas Illinois Natural Gas Pipe Line Co.—130 miles, 30-in., under way, Malvern to Newport, Ark. Bechtel Corp. Completion date 10-15-51.

Texas Illinois Natural Gas Pipe Line Co.—74 miles, 30-in., under way, Newport to Moark, Ark. Bechtel Corp., contractor. Completion date 10-15-51.

Texas-Illinois Gas Pipe Line Corp.—300 miles, 30-in., under way; Trinity River to Texarkana; H. C. Price, contractor. C. E. Shivel, spreadman at Carthage; C. R. Ice, spreadman at Nacogdoches.

Union Gas & Electric Co.—35 miles, 8-in., Bloomington to Harris, Ill. O. R. Burden, contractor. Floyd Lewis, spreadman at Bloomington, Ill., Fall completion date.

Union Oil Co. of California.—40 miles, 8-10-in., planned, San Joaquin Valley and Los Angeles Basin.

United Fuel Gas Co.—32 miles, 20-in., under way, Lanham to Broad Run, W. Va. H. L. Gentry Construction Co., contractor, Frank Morris, spreadman at Charleston, W. Va.

United Gas Pipe Line Corp.—315 miles, 24-30-in., contracted, Agua Dulce to near Goodrich, Tex. Oklahoma Contracting Co., contractor.

United Gas Pipe Line Corp.—53 miles, 24-in., authorized, Texas; 93 miles, 20-24-26-in., authorized, Houston, Beaumont, Orange, Tex.

United Gas Pipe Line Co.—80 miles, 16-in., authorized, Baldwin County, Alabama, southeasterly to **Escambia County, Florida.**

United Gas Pipe Line Co.—100 miles, 20-24-30-in., contracted, Near Houma **to Franklin, La.;** Associated Pipe Line Contractors, Inc.

United Gas Pipe Line Corp.—510 miles, 24-26-30-in., contracted, Agua Dulce, Tex., **to Monroe, La.; 233 miles, 20-24-26-30-in., from Pure Oil Co.'s offshore platform Block 32 Eugene Island area to Jackson, Miss.,** comp. sta.; 60 miles, 12-16-20-in., **from Lafayette** comp. sta. and Weeks Island field to Franklin, La., to connect with above mentioned 30-in.; 89 miles, 30-in., Jackson comp. sta., Miss., to Texas Eastern Trans. Corp.; 124 miles, Sterlington comp. sta. near Monroe, La., to Jackson comp. sta., Miss.; 23 miles, 8-12-16-in., South Louisiana facilities; all contracted by Gulf Southern Contractors, a joint venture including Texas Louisiana Contractors; Oklahoma Contracting Co.; J. Ray McDermott and Morrison-Knudson. Inspection by Brown & Root, Inc.

United Gas Pipe Line Co.—30-in., contracted, Gonzales, La., to Koscuisko, Miss. Texas-Louisiana Contractors. Completion date 11-51.

United Gas Pipe Line Co.—24-in., contracted, Baxterville, La., to McComb; **Texas-Louisiana Contractors.** Completion date 11-51.

U. S. Army Engineers.—190 miles, 6⅝-in., under way, Searsport to Limestone, **Me.;** Associated Pipe Line Contractors, Inc. Completion date 10-15-51.

U.S.E.D.—18 miles, 8⅝-in., contracted,

HIGHWAY CONSTRUCTION EQUIPMENT

AUTOMOBILES, TRUCKS

BANKRUPTCY SALE

BY

PUBLIC AUCTION

Pursuant to an order by the HON. CARL D. FRIEBOLIN and the HON. WM. B. WOODS, Referees in Bankruptcy, Cleveland, Ohio

We Will

★ BEGINNING AT CINCINNATI, OHIO ★

THURSDAY, SEPTEMBER 13, 1951 at 10:30 A.M. (Cincinnati Time)
On The Premises Of
THE HIGHWAY EQUIPMENT CO.—2150 LANGDON ROAD—CINCINNATI, OHIO

★ AND CONTINUING ON ★

FRIDAY, SEPTEMBER 14, 1951 at 11:00 A.M. (Daylight Saving Time)
To The Premises of
LING FIELD—HAMILTON ROAD—BARBERTON, OHIO
(½ Mile North of Route #5)

offer for sale by

PUBLIC AUCTION

HIGHWAY CONSTRUCTION EQUIPMENT, TRUCKS, AUTOMOBILES & EQUIPMENT of THE POSTON CONSTRUCTION CORP., Bankrupt

EQUIPMENT:

D 7 Caterpillar tractor, ser. #3T12439, equipped with MD-7 pipelayer; D 7 Caterpillar tractor, ser. #9U5564 with new Hyster winch; D 7 Caterpillar tractor, ser. #3T73475 with Trackson pipelayer; D 7 Caterpillar tractor, ser. #3T13457 with Trackson pipelayer; D 6 Caterpillar tractor, ser. #9U5565 with Hyster winch; D 7 Caterpillar tractor, ser. #3T13555 with Hyster Hystaway and back fill 8' blade; D 4 Caterpillar tractor, Lorain backhoe model TL with Amsco bucket; Cleveland trencher model 110-4 D 7 Caterpillar tractor, ser. #4T4293 with tilt dozer and caterpillar cable controls; D 7 Caterpillar tractor with Trackson pipelayer and Trackson anglefiller; Lorain backhoe, ser. #19641 with bucket; Clam shell buckets and Wellman dragline bucket; D 4 Caterpillar sideboom; Case highlift; 95 Baby Cleveland ditchers; Ingersoll-Rand 105 Compressor; Dope kettles; Insley booms W/buckets; Insley excavator W 20' boom; Pipe trailer, Dope pots; Steel 4 wheel trailer; Field service Alemite unit W/aircompressor and gas engine; Longhorn mobile ditcher, gasoline powered, wheel type; Wisconsin gasoline engines; Gas driven Hobart welder; Jaeger pumps and hose; Pipe dollies; Gas pumps; Jack hammers; Boring machine W/hangers; Steel pipe racks; Space heaters; Welding outfits; Misc. lot of repair parts; Welding rod; Spare wheels and tires; Steel tanks; Large lot of misc. air hose, handtools and misc. supplies; Process horses; Shoring and blocking material; misc. lot of scrap metal, etc.

TRUCKS AND AUTOMOBILES

1950 2-ton CHEVROLET trucks with platform bodies and winches; 1949 2-ton CHEVROLET trucks with platform bodies and winches; 1948 2-ton CHEVROLET trucks with platform bodies and winches; 1949 MACK tractor with 3-ton automatic trailer hitch—10 speeds; 1949 CHEVROLET utility truck with Lincoln electric welder; 1949 CHEVROLET dump truck; WHITE half-truck with steel boom and power lift, etc.

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APPRAISERS
CLEVELAND, OHIO

Norwalk to Long Beach, Calif. J. E. Young Pipeline Contractor, Inc.

Utah Natural Gas Co.—300 miles, 22-in., proposed, San Juan Basin area to Salt Lake Utah.

Virginia Natural Gas Co.—125 miles, Buckingham to Richmond and Portsmouth, Va.

Westcoast Transmission Co., Ltd.—1,400 miles, 30-in., planned, northern Alberta to Vancouver, B. C., and northern California.

Western Kentucky Gas Co.—2 to 4-in., under way, additions to present system; Modern Welding Co., Inc., contractor.

Western Pipe Lines.—1,200 miles, 22-in., planned, Southern Alberta to Duluth, Minn.

West Texas Gas Co.—27 miles, 10-in., authorized, Lubbock to Abernathy, Tex.

Foreign Crude-Oil Pipe Lines—Planned and Under Way

Alberta Pacific Oil Pipe Line Co. (Brokaw, Dixon, McKee).—670 miles, 16-in. proposed, Edmonton south to Kingsgate, B. C., to Washington to Vancouver, B. C.

Cia. de Petroleo Ganso Azul, Ltd.—48 miles, 4-in., planned, Ganso Azul field to Pucalpa on upper Ucayali River, Peru.

Condor S.P.A. (Shell).—80 miles, planned, Genoa to Rho, near Milan, Italy.

Direccion General de Yacimientos Petroliferos Fiscales.—400 miles, under way, Plaza Huincul to Bahia Blanca, Argentina.

Independent Pipe Line Co.—721 miles, 16-18-22-in., proposed, Edmonton to Vancouver. Spreads as follows: 185 miles of 22-in.; 391 miles, 20-in.; 95 miles, 16-in.; and 30 miles, 18-in.

Iraq Petroleum Co., Ltd.—556 miles, 30-32-in., under way, Kirkuk, Iraq, to Banias, Syria, 1952; Bechtel-Kirkuk, contractor.

Middle East Pipelines, Ltd.—600 miles, 34-36-in., planned, Iran to a Levantine port.

Petroleos Mexicanos.—145 miles, 12-in., considered, 18 de Marzo field via Reynosa to Monterrey, Mexico.

Petroleos Mexicanos.—100 miles, planned, Isthmus of Tehuantepec, Jose Colomo to El Plan field, Minatitlan.

Shell Caribbean Petroleum Co.—165 miles, 30-in., under way; Palmarejo to terminals on the Paraguana Peninsula (Cardon and Las Piedras, Venezuela), 12-51. Land sections contracted by Williams Brothers, de Venezuela, S. A., Charles P. Williams, manager, Marvin E. Jones, superintendent. Water crossings contracted by Mahoney Contracting Co.

Trans-Mountain Oil Pipe Line Co.—715 miles, proposed, Edmonton, Alta., to Vancouver, B. C. Canadian Bechtel, Ltd., contractor. Completion date 1952.

Winnipeg Pipe Line Co., Ltd.—75 miles, 10-in., under way, Gretna to Winnipeg, Manitoba; Sparling-Fowler Co., Ltd.

Foreign Products Pipe Lines—Planned and Under Way

Colombia Ministry of Petroleum.—90 miles, 8-in., planned, Puerto Berrio to La Dorada, Colombia.

Colombia Ministry of Petroleum.—113 miles, 6-in., contracted, Puerto Berrio to Acedeo near Medellin, Colombia. Carolina Construction Co.

Colombian Ministry of Petroleum. — 75 miles, 4-in., planned, Buena Ventura to Cali, Colombia.

Empresa de Ferrocarriles Ecuatorianos.—80 miles, 4-in., under way, Guayaquil to Palmira, Ecuador. J. A. Jones, contractor.

Estrada de Ferro Santos Jundial.—32 miles, 10-in., under way, Santos to Sao Paulo, Brazil; Techint, contractor, completion date 12-51.

Estrada de Ferro Santos a Jundial.—32 miles, 18-in., under way, Santos to Sao Paulo, Brazil (fuel oil line); Techint, contractor. Completion date 12-51.

Governments of Southern Rhodesia and Portuguese East Africa.—200 miles, considered, Beria, Portuguese Mozambique to Umtali, Southern Rhodesia.

Imperial Oil Co., Ltd.—10-in., planned, Sarnia to London, Hamilton to Toronto.

Petrocongo (Sub. Cie. Financiere Belge des Petroles, S. A.).—225 miles, considered, Ango-Ango to Leopoldville, Belgian Congo.

Petroleos Mexicanos. — 155 miles, 10-in., under way, Minatitlan to Salina Cruz, Mexico.

Societe des Transports Petroliers par Pipe Line. — 140 miles, 10-in., under way, Le Havre to Paris, France. Entrepose, contractor. Completion date 1952.

Shiale of Cundinamarca, Colombia. — 130 miles, 6-in., Puerto Salgar, to Bogota, Colombia; Williams Brothers Corp., David Louthen, manager, Bogota.

Trans-Northern Pipe Line Co.—400 miles, proposed, Hamilton, Ont., to Toronto, Ont., to Montreal, Que., Canada.

Foreign Natural-Gas Pipe Lines—Planned and Under Way

Azienda Generale Italiana Petroli.—110 miles, 12-14-16-in., planned, Cortemaggiore to Genoa.

Azienda Generale Italiana Petroli. — 110 miles, planned, Cortemaggiore to Bologna.

Azienda General Italiana Petroli. — 145 miles, 14-16-in., under way, Cortemaggiore to Torino. Completion date 1951.

Canadian Western Natural Gas Co., Ltd.—27 miles, 8-in., under way, Jumping Pound to Exshaw, Alberta. Company crews. Completion date 10-51; 22 miles, 6-in., under way, Exshaw to Banff. Company crews. Completion date 10-51.

Canadian Delhi Oil Co. (Subsidiary Delhi Oil Co.).—2,132 miles, proposed, Alberta, Toronto, Montreal.

Direccion General del Gas del Estado.—310 miles, 8-in., under way, Plaza Huincul to Neuquen, Argentina, to the vicinity of General Conesa, Argentina.

Northwest Natural Gas Co.—950 miles, 24-in., planned, Alberta fields to Vancouver, B. C., Seattle, Wash., and Portland, Ore.

Northwestern Utilities, Ltd.—35 miles, 16-in., authorized, Viking to Shonts, Alberta.

Petroleos Mexicanos. — 205 miles, 16-in., considered, Monterrey to Torreon, Mexico.

Petroleos Mexicanos.—260 miles, 20-in., under way, Monterrey to Tampico and Poza Rica, Mexico.

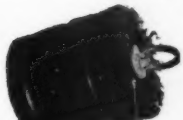
THE PIG WITH THE POKE — CLEANS PIPE LINES

— THE VERY LATEST —

Williamson Pipe Line Pigs*

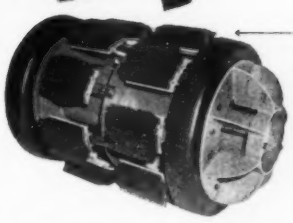
FOR CLEANING

Natural Gas Pipe Lines

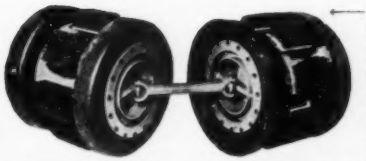


4" Size—TYPE JRN—2" to 4" sizes. Will pass 1½R-90° Bends. No valves other than full diameter thru-port valves. Use TYPE SCN-51 for 6" Size.

8" Size — TYPE WC-11 — 8" to 14". Will traverse 6 foot radius field bends, full diameter side opening at 45°. SPRINGS COMPENSATE for BRUSH WEAR.



20" Size—TYPE GP-2—16" to 30". 200-LB. SPRING Forces the Brushes against pipe wall —COMPENSATING for WEAR. Will traverse round-opening gate valves. SPRINGS and BRUSHES are identical and interchangeable for all types and sizes of GP PIGS.



24" Size — GP-3 — 18" to 30" Sizes will pass 1½R-90° Bends. SPRINGS COMPENSATE for BRUSH WEAR, ASSURING Full section cleaning efficiency. GP-3 consists of two Type GP-1 Pigs. — Each Unit may be used as individual pig.

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When planning your pipe line ... plan for protection

Bitumastic 70-B Enamel being machine-applied to a 20-inch gas transmission line.

PIPE-LINE engineers are proud of their completed pipe-line projects. They are the result of careful planning, expert engineering skill and plenty of hard work. And these projects deserve the best possible protection against corrosion — the protection provided by Bitumastic Enamels.

"The best possible protection against corrosion"— this claim is based on actual service records . . . on *proved* performance. Many pipe lines are still carrying gas and oil underground, after more than 30 years good service. And these durable enamels have established these records under the most severe corrosive conditions.

Further, the experience gained by Koppers in safe-guarding thousands of miles of pipe lines against corrosion is available to you. Discuss your next pipe-line project with one of our representatives. He will give you complete details concerning Bitumastic Enamels.

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Bitumastic Enamels soon available from Koppers new California Plant!

As soon as present construction work is completed, Koppers will be able to supply Bitumastic Enamels from a new plant at Fontana, California. The plant is being built to give you better service in the west.

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REG. U.S. PAT. OFF.

KOPPERS COMPANY, INC., Tar Products Division, Dept. 903-T Pittsburgh 19, Pa.

PIPE LINES

Service Awards Contract For Reclaiming Old Line

Service Pipe Line Co. has awarded contract to C. L. Rogers Construction Co., Wichita Falls, Tex., to take up and recondition 23 miles of 10-in. looping on the company's Wyoming-Missouri trunk line in Platte County, Wyoming.

General Manager C. M. Scott said the loop was no longer required since larger pipe has been installed in this section of the system. The reclaimed pipe will be reconditioned at Cassa, Wyoming, and shipped to Texas. There it will go into construction of a line between Wasson and Denton.

Scott reported that construction is more than 50 per cent complete on the 23-mile, 10-in. extension of Service's system from Bowie to the Old Glory area in West Central Texas. *(The Oil and Gas Journal, July 12, page 113, and August 16, page 177.)*

Smith Construction Corp., Fort Worth, is laying 57 miles of the line from Old Glory to the Brazos River, while O. R. Burden Construction Co., Tulsa, is building 66 miles from the Brazos to Bowie. The latter section includes a river crossing.

Preparation of right-of-way has been completed by Engineers Limited Pipe Line, Denver, on a short section of 12-in. line from near Sycamore, Kans., to the Standard Oil Co. (Ind.) refinery at Neodesha, Kans. Casing has been installed under U.S. Highway 75.

The last of three new 167,000-bbl. storage tanks at Service's Manhattan, Ill., pump station has been completed.

Tennessee's Hebron-Utica Line Again Turned Down

WASHINGTON. — Tennessee Gas Transmission Co.'s plan to build a 162-mile natural-gas line from Hebron underground-storage field in Potter County, Pennsylvania, to its main line in Utica, N. Y., received its second rebuff from the Federal Power Commission last week.

However, the commission did modify its June 1 order by eliminating conditions imposed on the company's sales to three customer companies.

The June 1 order authorized Tennessee to build natural-gas facilities to increase daily delivery capacity of its system from 1,310,000,000 cu. ft. to 1,395,000,000 cu. ft.

Tennessee in asking for a rehearing of the June 1 order said that the commission had set conditions which made the whole project unacceptable.

The part of the commission's June 1 order making sales of gas to three customers subject to curtailment in the event any of the gas scheduled for delivery to them was required for development and operation of the

***FINAL BEAD.**—Welders put on final bead at Venice location along United Gas Pipe Line Corp.'s new 16-in. natural-gas line across the soggy Mississippi River delta. The line will pipe gas, formerly flared, from Westbay oil field just west of the ship-channel entrance to Kaiser's new aluminum-reduction plant at Chalmette, La. The tracked vehicle holding the pipe at left is an International TD-18A crawler.*

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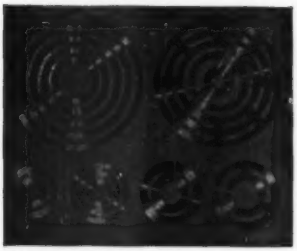

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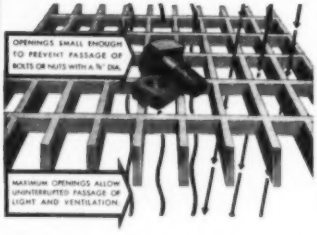
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The Tri-Lok Company is also equipped to furnish *riveted* and Tri-Forge *welded* open steel flooring. Tri-Lok grating can be furnished in a variety of metals, including aluminum alloy, stainless steel, etc.

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Hebron storage project was rescinded. The three companies, United Natural Gas Co., Iroquois Gas Corp., and Equitable Gas Co., each will receive 15,000,000 cu. ft. of gas daily from Tennessee with no conditions imposed in the new order.

Columbia Subsidiaries Get FPC O.K. for New Facilities

WASHINGTON.—Three subsidiary companies of Columbia Gas System, Inc., were authorized by the Federal Power Commission last week to build new natural-gas-transmission facilities in Kentucky, Ohio, and West Virginia.

The commission, however, denied a proposal to build 13 miles of line to carry additional gas to the Cincinnati market area.

Central Kentucky Natural Gas Co., whose application for the Cincinnati line was rejected, was granted permission to build about 19 miles of line to increase supplies of gas to the company's southern division which extends roughly from Inez to Lexington, Ky.

Ohio Fuel Gas Co., Columbus, will proceed with construction of 161 miles of lines in northern and southwestern Ohio. These facilities, estimated to cost about $2,690,000, will help meet increasing demands in the Sandusky, Elyria, and Dayton market areas.

Atlantic Seaboard Corp., Charleston, received the go-ahead from the commission to build a compressor station in Randolph County, West Virginia, on its line from Cobb, W. Va., to Rockville, Md., to increase deliveries to the Washington and Baltimore areas.

Manufacturers Asks to Buy United Fuel Gas Facilities

WASHINGTON.—Manufacturers Light & Heat Co., Pittsburgh subsidiary of Columbia Gas System, Inc., has filed application with the Federal Power Commission to purchase about 136 miles of natural-gas-transmission lines and the 2,400-hp. Carnegie compressor station in West Virginia from United Fuel Gas Co., Charleston, W. Va.

The properties, which have an estimated original cost of $3,638,728, are located in Gilmer, Marshall, and Wetzel counties, West Virginia. Depreciation is estimated at $572,748.

Pipe-Lines Briefs

Cross examination started last week in a hearing before the Federal Power Commission on Midsouth Gas Co.'s application to build a 219-mile natural-gas gathering system.

Midsouth would pipe gas through the $10,000,000 system to 12 eastern Arkansas counties.

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NATURAL GAS

Chemico Acquires Rights For New Acetylene Process

NEW YORK.—The partial oxidation process for snythesis of acetylene from natural gas received further commercial support recently when Chemical Construction Co. of New York announced the acquisition of a commercially proven, low-cost technique for producing the multipurpose basic chemical.

Chemico now holds exclusive North American rights to the use of the new process developed by the German firm of Badische Anilin Soda-Fabrik for the design and construction of plants.

The new process, based largely on the original German Sachsse process, provides for the partial oxidation of natural-gas hydrocarbons to produce a crude acetylene gas.

This product is then purified through the use of a selective solvent specially developed for the process to yield acetylene of any desired purity. In this respect the new process indicates a major contribution to the provision of lower-cost acetylene from natural gas, since production of high-purity acetylene has represented a major drawback to natural-gas processes as compared with the time-honored calcium-carbide process.

Acetylene synthesis is currently hailed as the most promising new departure in petrochemistry.

Texas' June Gas Production 24 Per Cent Over Last Year

AUSTIN.—Production of natural gas in Texas during June stood at 370,353,447 M.c.f., according to figures just released by the Texas Railroad Commission.

This is about 14,500,000 M.c.f. less than that produced in May but 16.43 per cent above that produced during June 1950. Total marketed production was up 23.62 per cent over last year.

Gas for underground storage registered the biggest percentage increase, 100 per cent, although it still represents only .01 per cent of total production. The lion's share again went to transmission lines which took 216,552,805 or 58.47 per cent of the total—up 29.71 per cent over last year.

Gas for gas lift, recycling, and carbon-black manufacturing also showed gains. That used for pressure-maintenance and repressuring operations

Southern to Buy Gas From Mississippi Delta Fields

BIRMINGHAM.—Southern Natural Gas Co. has negotiated a contract with The California Co. for the purchase of natural gas from nine fields in the Mississippi River delta area south of New Orleans.

Recoverable reserves, most of which are located in Plaquemines Parish, Louisiana, are estimated at more than 400 billion cubic feet.

Southern Natural must secure Federal Power Commission approval for necessary gathering facilities and other conditions must be fulfilled before actual taking of gas can be begun.

Underground-Storage Experts To Direct Panel Discussion

AUSTIN.—The engineering committee of the Interstate Oil Compact Commission will hear a panel discussion on preliminary surveys of underground reservoirs and actual storage and withdrawal of natural gas during the summer meeting at Fort Worth, September 10-11.

Gov. Allan Shivers, Texas, chairman of I.O.C.C., announced that the panel will consist of three industry men, all experts in this phase of conservation. They are Russell W. Hofsess, Cities Service Gas Co.; Carl Cloud, Oklahoma Natural Gas Co.; and C. E. Loomis, Columbia Gas System, Inc.

The committee will meet in an all-day session on September 10 and prepare a report on the panel discussion for presentation at the general session the following day.

ULTIMATE DISPOSITION OF ALL GAS PRODUCED IN TEXAS DURING JUNE
(Source: Texas Railroad Commission)

	M.c.f.	Per cent of total	Per cent increase over June 1950
Extraction loss—plants*	13,288,793	3.59	11.64
Plant fuel and lease loss	27,537,748	7.44	1.40
Gas lift	14,238,938	3.84	13.92
Pressure maintenance and repressuring	21,143,347	5.71	21.56
Transmission lines	216,552,805	58.47	29.71
Recycled	46,856,397	12.65	.67
To carbon-black manufacturing	26,449,869	7.14	11.40
Underground storage	12,377	.01	100.00
Vented and line loss	4,271,173	1.15	83.53
Total	370,353,447		16.43
Net total for market	302,351,703		23.62

*Extraction loss is shrinkage in gas volume due to removal of liquefiable hydrocarbons.

A.G.A. Enlarges Laboratory

CLEVELAND.—The American Gas Association opened a new two-story addition to its test laboratories here recently.

The $300,000 addition, third since the laboratories were opened in 1925, will about double the floor space.

A.G.A. also maintains laboratories in Los Angeles, and now tests more than 4,000 models of gas appliances annually for safety, durability, and efficiency.

Natural Gasoline

Manual Dealing With L.P.G. Carburetion Soon Off Press

A new manual, "How to Convert to LP-Gas Carburetion," covering all types of L.P.G.-carburetion installations and conversions will soon come off the press.

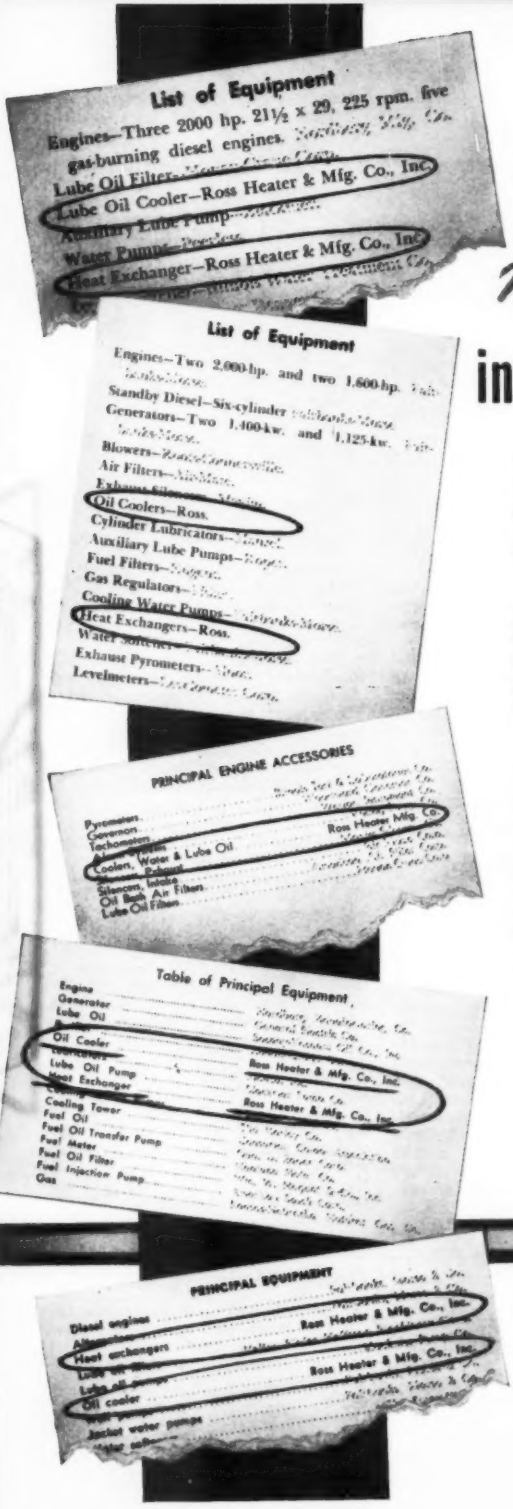
The booklet, said to be the first complete coverage on the subject, was designed for use by implement manufacturers, tractor and implement dealers, L.P.G. distributors and dealers interested in converting automotive and stationary engines to L.P.G. It was compiled and written by T. E. Wisby, director of training of the National LP-Gas Institute at Tulsa.

The manual treats on: (1) Design and operation of internal-combustion engines; (2) power obtained from fuel in various ratios; (3) various types of battery and magneto ignition; (4) the function and regulation of cooling systems; (5) proper lubrication; (6) parts and functions of L.P.G.-carburetion systems and the various conversion problems involved; (7) how to test the several devices involved in satisfactory conversions; (8) engine specifications and data; (9) proper installation of both vapor and liquid-withdrawal systems; (10) trouble shooting various types of equipment; (11) state and other regulations relating to L.P.G. carburetion equipment and its use; and (12) the economics, sales, and general service problems involved.

Stanolind to Build New Gasoline-Stripping Unit

SHREVEPORT.—Stanolind Oil & Gas Co., Tulsa, will build a new gasoline-stripping unit at its Gilliam natural-gasoline plant near here to process 1,500,000 cu. ft. of gas per day.

Blaw-Knox Co., Pittsburgh, will build the unit which will be equipped with a water cooling system and a safety shutdown. The plant will remove liquid vapors, butane, propane, and other liquid fractions from gas.



the exchanger *mentioned most* in engine equipment lists

It can be about a municipal power plant, a pipeline or a truck; an oil refinery, a chemical plant or a ship — most any industrial magazine feature story on engine or compressor installations shows "Ross Exchangers" in the equipment list.

See for yourself. The next time you glance over a story on a Nordberg, Cooper-Bessemer, Fairbanks-Morse, Worthington, Ingersoll-Rand, Cummins, Caterpillar application, to name a few, turn to the equipment list. See how many times it reads "Oil Cooler: Ross Heater. Heat Exchanger: Ross Heater."

There's more than one reason, of course. But the most important is that engine builders have service reputations to protect. An exchanger, though relatively small in cost, must measure up in dependability, as must its manufacturer. That's principally why Ross has long been standard with the most and the biggest. An exchanger must be well suited, design-wise and cost-wise . . . two requirements that Ross fulfills with unique success through its industry-leading standardization and mass production.

THE FACTS ARE IN THIS LITERATURE — To be familiar with the Ross Exchangers that are mentioned so often, request Bulletin 2.1K1 for engines of larger hp ratings and Bulletin 1.1K1 for the smaller.

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REFINING

W.P.R.A. Meeting at Casper Rounds Into Final Form

CASPER, Wyo. — Three technical papers are scheduled for presentation at the September 20-21 meeting here of the Western Petroleum Refiners Association.

They include: "Octane Numbers," A. D. Puckett, E. I. du Pont de Nemours Co.; "Refining of Green River Shale Oil," S. S. Tihen, U. S. Bureau of Mines Experiment Station at Laramie, Wyo.; and "Application of Radiant Heat to Vis-Breaking and Vacuum Operations," J. W. Sanberg, Phillips Petroleum Co. The technical papers will be presented September 21.

During the first day, refiners will hear talks on new approaches to better industrial relations in refinery operations by A. E. Finessy, International Minerals & Chemicals Corp., and Max W. Beaty, Standard Oil Co. (Ind.). Other first-day speakers will be Jack Carter, Shell Oil Co., and Harry B. Kniseley, Carter Oil Co.

The 100 or more refiners expected to attend the meeting also will be given an opportunity to observe a fire-fighting demonstration at the Socony-Vacuum refinery in Casper.

Shell Installs Equipment To Speed Laboratory Tests

MARTINEZ, Calif. — The research department of Shell Oil Co. has installed 12 multiple-point automatic controllers at its plant here to increase substantially the number of testing units one operator can handle.

The new automatic units replace manually operated ones, for indicating and controlling temperatures in laboratory testing of fuels and lubricants.

Each of the 12 "TAG Celectray Multiple Point Indicating Potentiometer Controllers" has six control points and can control six tests simultaneously.

At the Martinez laboratory, the controllers test performance of oils and lubricants in engines ranging in size from one cylinder to the largest truck and tractor motors.

Ten of the units are used on engine-test stands to control the flow of additional cooling water or steam to engine jackets, oil-heat enchangers, fuel-heat exchangers, and comparable equipment. Two control electric heaters which maintain desired temperatures in conjunction with use of bearing-test machines.

New Plant Will Produce Micro-Spheroidal Catalyst

LAKE CHARLES, La. — Davison Chemical Corp.'s new plant to be built near here *(The Oil and Gas Journal, August 30, page 111)* will produce the micro-spheroidal type of synthetic silica-alumina catalyst, according to R. L. Hockley, vice president.

The plant is scheduled to go into production early in 1953 and will have facilities to produce cracking catalyst sufficient to process nearly 600,000 bbl. of petroleum feed stock daily.

Particles of the micro-spheroidal

NELSON REFINERY-CONSTRUCTION INDEX

Appears in the first issue of each month.
Explanation—Cost-imating No. 61, December 15, 1949, pages 91, 92.
Compiled by W. L. Nelson—Refinery Consultant—Tulsa.
Indexes of Individual Equipment Items—January, April, July, October.

INDEX (1946 = 100)

	1947	1948	1949	1950	May 1951
Centrifugal pumps	109.0	120.0	118.9	128.1	136.2
Reciprocating pumps	128.5	138.1	144.6	143.9	183.3
Compressor	114.0	128.0	120.0	118.8	138.1
Engines	109.0	120.0	115.6	117.9	137.1
Motors	110.0	112.7	114.0	130.8	148.8
Transformers	116.0	116.0	116.0	116.0	130.5
Instruments	113.0	120.0	122.0	127.8	142.4
Miscellaneous equipment average	114.2	122.1	121.6	126.2	145.2
Materials component	122.4	139.3	143.6	149.5	164.5
Labor component	113.5	128.0	137.1	144.0	150.9
Refinery construction index	117.0	132.5	139.7	146.2	156.3

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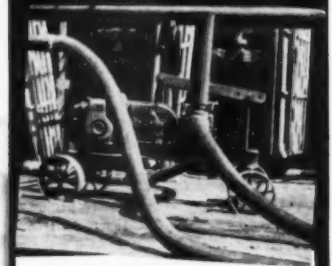
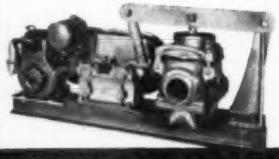


A leading Kansas refinery uses this 4 inch Marlow Mud Hog pump to save time and money in the cleaning of cooling towers.

This and many other progressive refineries can remember when it took a refinery shut down and about twelve men to shovel the muck out of their cooling tower basins. Now, with a Marlow Mud Hog the muck is pumped into a settling basin for convenient disposal — a spare time operation that requires just two men to circulate a gathering dome. Still more important, the cleaning can be done without costly shut downs.

A Marlow Mud Hog helps pay for itself quickly by doing many additional pumping jobs, too — cleaning out sumps, tank bottoms and other important refinery services. Write for complete information.

Available base mounted or with steel wheels or rubber tires.



MARLOW PUMPS
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type of catalyst are more nearly uniform in size and more nearly spherical than many former types.

An outdoor type of plant similar to petroleum-refining design will be built at the site on Calcasieu River 6 miles south of Lake Charles. General contractor for the project is Consolidated Engineering Co., Baltimore. Day & Zimmerman, Inc., Philadelphia, are engineers.

The new plant's equipment will be similar to that in the company's Cincinnati plant for producing the same catalyst. The basic pieces of equipment are the big stainless steel spray-drying chambers which form catalyst particles. The chambers are cylindrical at bottom and cone-shaped at the top.

Hockley said that in addition to developing additional source of catalyst supply for the Gulf Coast, the new plant will enable savings in transportation of the finished product and some of the raw materials.

Revised A.P.I. Manual on Refinery Wastes Available

NEW YORK.—Comprehensive information on chemical wastes from refineries is brought up to date in the latest edition of an A.P.I. manual now off the press.

The manual is the second edition of Volume 3, Chemical Wastes, of the A.P.I. Manual on Disposal of Refinery Wastes.

The new 40-page booklet contains five chapters describing properties and sources of chemical wastes in refineries, the effect of chemical wastes on surface waters, information on methods and devices for treatment and control of wastes, and some recommended practices covering equipment and operation of disposal facilities. Extensive lists of references are included.

The new edition, prepared by the A.P.I. committee on disposal of refinery wastes, is available for $1.50 a copy through the American Petroleum Institute, 50 W. 50th Street, New York 20, N. Y.

New Bunker C Tank-Cleaning Method Reported Developed

GARWOOD, N. J.—A new cleaning method reported capable of easier and faster cleaning of Bunker C fuel-oil-storage tanks has been developed by Magnus Chemical Co., of Garwood.

An emulsifiable solvent cleaner, Magnusol HD, is mixed with distillate (1-to-10 ratio) and sprayed on walls of the tank through a large spray gun. By the time the entire inner surface of the tank is sprayed with the mixture, the surfaces first treated are reported ready to be flushed off with water under pressure.

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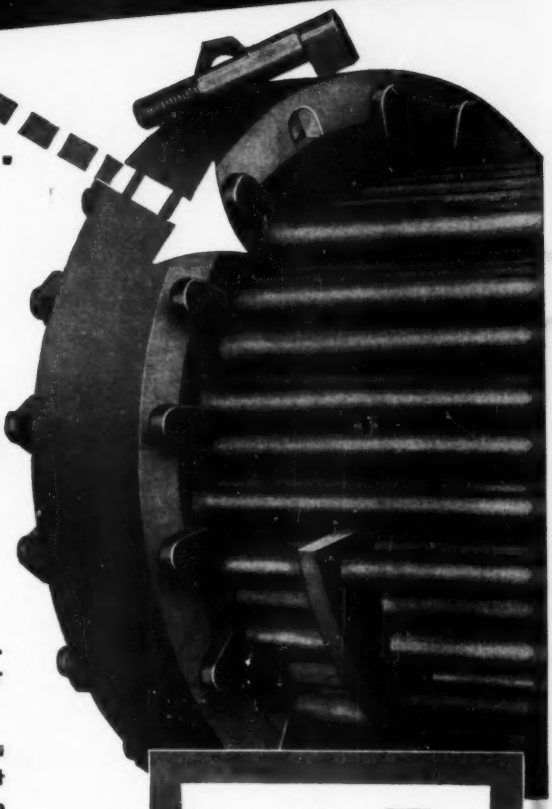

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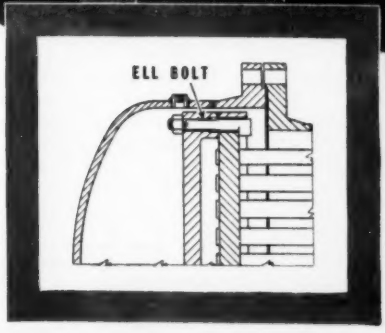

Bulletin HE-6 is a pictorial presentation of standard and special types of Vogt Heat Exchangers. Write for a copy on your letterhead.

Patent Nos.
1,895,735
2,232,478

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- The Fox Portable Mast is a proven product, boasting all of the features of present day equipment plus many innovations offered for the first time to the oil industry.

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Dunlap & Graham Drilling Fourth of 10 Peru Tests

Dunlap & Graham Drilling Co., Inc., Long Beach, Calif., reports that it has completed 3 of the 10 deep exploratory tests it has contracted to drill in northern Peru for Empresa Fiscal Petroleo. Its rig now is on the fourth test. The project was started in April 1950. All holes are projected to depths around 9,000 ft. So far, no production has been found. Operations are directed from a division office in Lima with W. J. (Swede) Larson, vice president of the company, in charge. Field headquarters are at Zorritos.

Martin-Miller Brothers Form New Drilling Firm

James Martin, formerly field superintendent in West Central Texas for Sojourner Drilling Co., Ltd., and Jack and Jake Miller of Miller Brothers, cable-tool contractors, have organized the Martin Drilling Co., a rotary-drilling contracting firm. Headquarters are at Abilene, Tex.

Martin, who will supervise the company's rotary drilling operations, has been active in oil-field work for more than 29 years. Prior to his association with Sojourner Drilling Co., Ltd., he was tool pusher for Big West Drilling Co. in the West Texas-New Mexico district. He moved to the Abilene area in 1946.

The Miller brothers will continue their cable-tool contracting operations. They have been active in this work for many years, having been associated in this business with their father, the late U. L. Miller, a long-time cable-tool operator.

The new company's first job is a wildcat test being drilled for Basin Oil Co. of California near Haskell, in Haskell County, Texas.

Strain Drilling Co., Hays, Kans., has moved a rig to a rank wildcat location in northwestern Graham County, where it will drill for Harry Gore at 1 Bell, SW SW NW 14-6-24. The location is 11 miles from nearest production.

Johnson Drilling Co., Tyler, Tex., is drilling D. C. Carnes 1 Hardeman, 18-22n-14w, a Woodbine sand test in the Hosston field, Caddo Parish, Louisiana.

Zack Brooks Drilling Co., El Dorado, Ark., is the contractor and joint owner with Houston Oil Co. at a new Birdson-Owens test, 1 Crump-Sale-Scott, being started in the East Hayes-

Drilling crew on one of the two large barge-mounted rigs Kerr-McGee Oil Industries, Inc., Oklahoma City, is operating under contract in the Dagger Island area, in the San Patricio County sector of Corpus Christi bay, lower Gulf Coast region of Texas. Left to right: Wayne Robinson, derrickman; J. D. Rainwater, driller; J. D. Symms and J. C. Liddell, motormen; C. A. Dorsey and L. R. Jackson, floormen. W. C. Womack, not shown, is tool pusher. Picture was taken on a location drilled for Sun Ray Oil Co. in 30 ft. of water.

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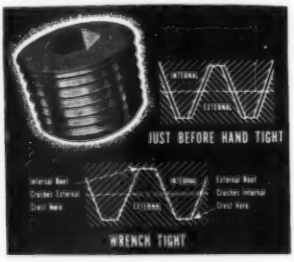

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ville field, Claiborne Parish, North Louisiana. Location is in 9-23-7w.

H. Waggoner Drilling Co., Oklahoma City, is starting another well for Midstates Oil Corp. in the southwest sector of the West Peck pool, Lincoln County. The new test is 2 Moore, SW NW NW 5-13n-6e, a location south of 1 Moore, just completed and from which the rig has been moved. Pay zone is Prue sand around 3,200 ft.

Shamrock Drilling Co., formerly Briscoe-Clingman Drilling Co., Oklahoma City, is working on two new Continental Oil Co. contracts. One calls for a 4,500-ft. test, 1 Pruitt, located 1½ miles northeast of the Northwest Caddo gas area in Carter County, Oklahoma. The other is for 1 Baade, a wildcat in the NE NE NE 20-11n-2e, Pottawatomie County, Oklahoma.

Alco Drilling Co., Oklahoma City, is drilling for Gulf Coast Western Oil Co. at 1-B McCaughtry, a new operation in the old Chickasha gas field, Grady County, Oklahoma. Location is in the SW NE NW 35-5n-8w.

Thomas F. McCullough, Tulsa, has a cable-tool job under way in the abandoned gas area adjacent the Sapulpa city limits in Creek County. He is drilling for Lester Cox of Springfield, Mo. The test is 1-A Lawrence, SE NE NE 3-17n-11e. Hole is projected to 2,000 ft.

Davenport Drilling Co. is starting another well in the Hanbury district, Comanche County, Oklahoma, where it is drilling for William H. Atkinson of Oklahoma City at 1 Blumenshine, NE NE NE 12-2n-10w. Production objective is around 2,500 ft.

McCubin & Steagel, Kilgore, Tex., are moving a rotary rig to a rank wildcat location in the northwest corner of Wallace County, on the west edge of Kansas, where they have a contract for a test to be drilled for C. H. Brill. The location, 14 miles northwest of Sharon Springs in the C SW SE 36-11-42, is 6 miles from the Colorado line. It is on the operator's Hill lease.

ACTIVE ROTARY RIGS*
(United States and Western Canada)

Area—	Week ended 8-27-51	Change week ended 8-20-51	Change week ended 8-28-50
Gulf Coast	592	+3	+89
W. Tex.-N. M.	972	+12	+237
Ark.-N. La.-E. Tex.	160	+5	+9
Oklahoma	304	—32	+14
Kansas-S. Nebraska	182	—3	+45
Illinois-Eastern	150	—6	+13
Rocky Mountains	177	—4	+56
Pacific Coast	186	+4	+51
Total United States	2,723	—21	+514
Western Canada	151	+14	+62
Total	2,874	—7	+576

*Courtesy Hughes Tool Co. Trends in drilling activity in the United States and the Rocky Mountain and western Canada areas are shown on pages 152 and 153.

Rocky Mountain Drilling Co., Los Angeles, is drilling for Standard Oil Co. of California at 1 Unit, a wildcat test in the Burbank area, Millard County, Utah. Location is in the SW NE SE 3-22s-19w. Hole is projected to 4,000 ft.

Carter-Jones Drilling Co., Haynesville, La., is drilling on two new contracts in Mississippi. One is an 8,750-ft. wildcat test for Harold H. Duck in C NW SW 20-2s-8w, southwest of Berndale, George County. The other is an offset to the recently completed discovery well of the Glazier pool in Perry County, where it is drilling for Union Producing Co.

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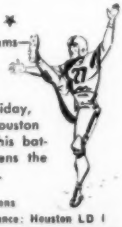

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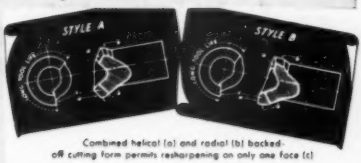

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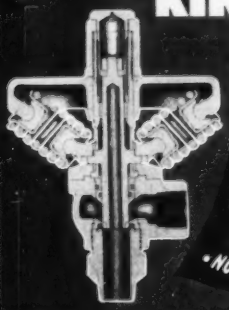

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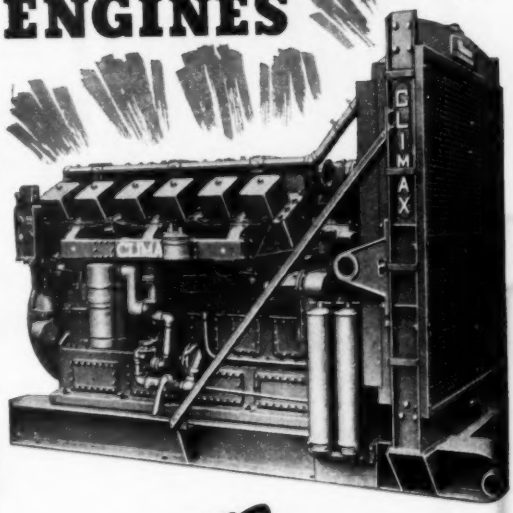

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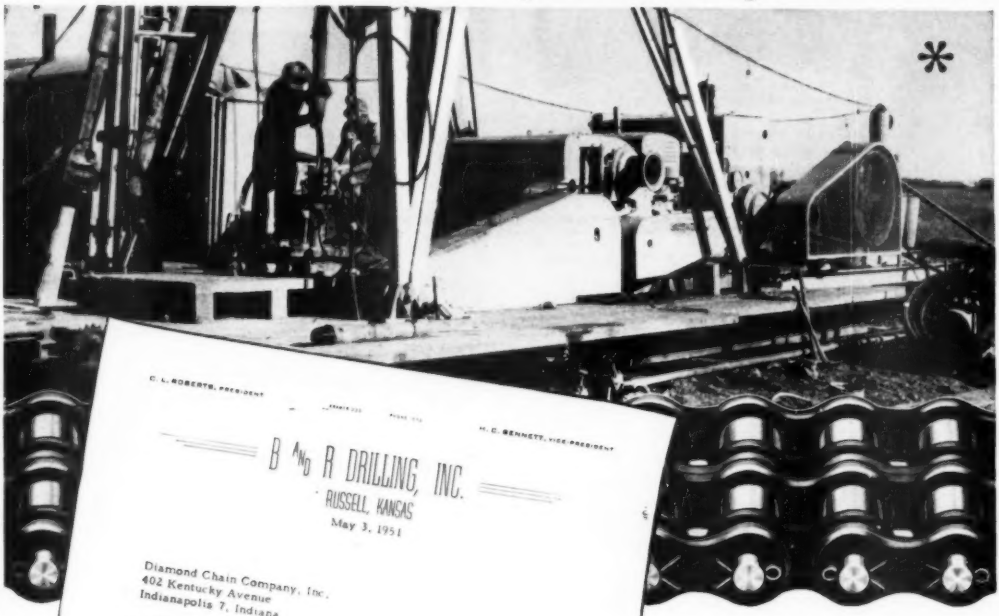

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Oklahoma's Springer Sands

RECENT developments in southwestern Oklahoma have turned up additional evidence that the immense importance of the Springer sands from the standpoint of ultimate reserves has not been overestimated.

The potentialities of the Springer (Pennsylvanian Morrow-Springer and lower Dornick Hills) have been growing constantly since they were first recognized about 7 years ago when Skelly Oil Co. found oil-saturated Springer sands off the northeast flank of Velma field. This discovery initiated a slow-to-get-started exploratory and development program that is going strong today *(see this page in February 22, 1951, issue)*. The bulk of Springer activity has been restricted to the Ardmore basin in the Velma-Sholem Alechem-Fox Graham area (G on map)—now it looks as though areas in the Anadarko basin to the north and west may soon see a more concentrated effort to develop Springer production.

At F on map is Vickers Petroleum Co. 1 Parks which is being completed in the Springer at 9,668-98 ft. This assured discovery's significance lies in the fact that it proves that the facies of the Springer as found near the northern wedge edge (there's no Springer at Golden Trend) is such that it will reservoir oil.

At C on map is Stanolind Oil & Gas Co. 1 Kennedy, an exploratory well which recovered several hundred feet of free oil on a drill-stem test of the Springer at 4,937-79 ft. If this wildcat, now drilling ahead, develops into a sizable Springer discovery it will go far toward souping-up the interest in the Springer along the entire Wichita Mountain front.

The southern limit of the Springer sands is known to be just out from the Wichita Mountain front and along an as yet questionably located hinge line between the Wichitas and the Arbuckle Mountains. These sands are complexly faulted in this area.

The northeastern extent of the Springer sands is yet to be determined except in the southeastern tip of the basin area, but current, tentative location of this wedge edge is in the general area of the question marks on the map.

It is known that the Springer thins

northward from the axis of the basin toward the wedge edge formed by truncation which took place between Morrow and Des Moines times, the same erosional period that cut the Springer from the Wichitas and from the crests of the larger structures in the Ardmore basin and on to the northwest.

The hunt for Springer production in the deeper portion of the Anadarko trough, where the sands may be thickest and uplifted to within accepted reach of the drill, may be yet some distance in the future except on the flanks of known structures such as Knox (E on map), where Springer production has been found on the west flank. The earliest development likely in areas other than the Ardmore basin will be along the southern, sharply bevelled edge. The search for the northern edge in the southwestern portion of the Anadarko basin will continue and when tied down may prove to be more attractive, by virtue of being less hazardous, than the fault blocks at the mountain front.

Springer production was found at Northeast Hobart (B on map) and at Chitwood (D on map) in 1945. At Northeast Hobart production is shallow and believed to be from overthrust Springer. Production at Chitwood is gas-condensate. In 1946 some Springer gas production was developed at Rocky (A on map).

The search for Springer is geology at its toughest. The complicated structures and fault blocks may be similar to those found in the Arbuckle Mountains. In the Arbuckles, where there's a lot of geology on the surface, the folds, faults, and thrusts have yet to be ironed out for general agreement—how long will it take for the geology of the Springer to be worked out where it's all below the surface? It looks as though the oil will have to be found on general geology and the detailed geology left for future generations.

Philip C. Ingalls.

HIGHLIGHTS OF WEEK'S DEVELOPMENTS

ALABAMA.—A show of oil in the lower Tuscaloosa has been encountered in Stanolind Oil & Gas Co. 1 F. A. Steward, Escambia County wildcat located about 39 miles east of nearest production at South Carlton. On a 45-minute drill-stem test at 5,938-41 ft. recovery was 30 ft. of 25°-gravity oil, water cushion, 90 ft. of oil-cut mud, 115 ft. of brackish water and 30 ft. of salt water cut with oil.

SOUTHEASTERN NEW MEXICO.—The Texas Co. 1-AR State, Devonian discovery north of Gladiola field, flowed 220 bbl. of new oil in 20 hours through a 19/64-in. choke.

NORTH CENTRAL TEXAS.—A prospective Pennsylvanian reef discovery in southeast Nolan was indicated when Seaboard Oil Co. of Delaware 1 Hanks flowed oil at an estimated rate of 15 bbl. hourly from 4,584-4,609 ft.

WEST TEXAS.—Sinclair 2 McElroy Ranch completed as fifth and largest producer of new Wilshire-Ellenburger field, Upton County. A 24-hour natural flow gaged 3,469.44 bbl. of high-gravity oil, through open tubing from 100 ft. of pay to 12,360 ft.

Southwest Texas

Red Fish Bay Pay Opener Potentials 108 Bbl. Daily

CORPUS CHRISTI.—Potential test has been run at Atlantic Refining Co. 1 State Lease 413, new pay opener and extensioner at Red Fish Bay, Nueces County. Through perforations at 7,950-60 ft., the well flowed 108 bbl. of oil daily through ⅛-in. choke. Gravity of the oil was 39.6°. The new pay section is tentatively identified as sand 10-A. Earlier attempts to complete in the field pay at 7,996-8,016 ft. resulted in a flow of oil and salt water. This well extends production approximately 1 mile to the south.

A new shallow gas formation has been opened in Eagle Hill field, Duval County, at Magnolia Petroleum Co. 48 Duval Ranch 201. Through perforations at 841-51 ft., the well flowed 1,700,000 cu. ft. of gas daily on open flow. Through 7/32-in. choke, flow was 280,000 cu. ft. daily, 362,000 cu. ft. through 8/32-in. choke, and 449,000 cu. ft. through 9/32-in. choke. Ths well was drilled to a total depth of 10,000 ft., and operators plugged back for completion in the shallow sand.

Gas production has been established 1 mile southwest of Jay Simmons field, Starr County, at Sun Oil Co. 1 J. L. Hinojosa. Initial production was calculated at 11,000,000 cu. ft. of gas daily on open flow. Perforations were effected at 6,275-6,395 ft., after drilling the well to 7,005 ft.

A new Frio County discovery is being completed at George W. Graham 1 T. P. Nowlin, John W. Crawford Survey, A-1080. Operator drilled the wildcat to 3,449 ft. and set 5½-in. casing at 3,410 ft. for open-hole completion in a sand showing oil in core at 3,411-49 ft.

In East Flour Bluff area of Nueces County, a new pay is being opened at Humble Oil & Refining Co. F-2 East Flour Bluff State located in Laguna Madres Bay State Tract 31. On 20½-minute drill-stem test at 8,700-50 ft., water cushion flowed at the surface in 7½ minutes, and the well flowed at an estimated rate of 8,800,000 cu. ft. of gas and 335 bbl. of 46°-gravity oil daily. Bottom-hole pressures were 5,975 to 6,000 psi.

A new pay is indicated at Sarita field, Kenedy County, at Humble Co. B-28 John G. Kenedy, Jr. A drill-stem test conducted at 6,254-71 ft. recovered 180 ft. of clean oil plus 135 ft. of oil-cut mud. An earlier test at 5,563-80 ft. showed possibilities of another new pay with recovery being 30 ft. of oil and 50 ft. of salt water. The well also showed for oil in regular field pay at 4,710-19 ft.

SOUTHWEST TEXAS (DISTRICTS 1 AND 4) SUCCESSFUL WILDCATS

Jim Hogg County: Oil discovery—Sun Oil Co. 21 Weil Bros., Santo Domingo de Abajo Grant, TD 5,705 ft., perf. 4,123-34 ft., IP: 40 bbl. oil per day on pump, 42.6° gravity.

Kenedy County: Gas discovery — Humble Oil & Refining Co. E-1 John G. Kenedy, Jr., El Paistle Grant, TD 11,794 ft., perf. not reported, IP: 10,000,000 cu. ft. of gas per day open flow.

Nueces County: New pay at Nueces Bay—The Texas Co. 1 State Tract 708, TD 4,041 ft., perf. 3,984-90 ft., IP: 118 bbl. oil per day on pump, 24.6° gravity.

SOUTHWEST TEXAS (DISTRICTS 1 AND 4) WILDCAT FAILURES

Atascosa County: Milam Drilling Co. 1 M. M. Davis, Adams, Beatty & Moulton Sur. 13, A-54, dry, TD 6,003 ft.

Bexar County: Frank E. Janiak, et al, 1 Albert J. Gemler, Juan Montes Sur., dry, TD 1,150 ft.

Jim Hogg County: Humble Oil & Refining Co. 1 Ophia F. Sweeney, Las Animas Grant, dry, TD 5,505 ft.

Paisano Trading Co. 1 Jose Maria Guitierrez, Lot 9, Sur. 144, dry, TD 3,211 ft.

Pontiac Refining Corp. 3 Roy Yeager, AB&M Sur. 167, Cert. 745, dry, TD 3,108 ft.

Jim Wells County: Bright, Schiff & Kennedy 1 J. E. Benton, J. H. Beymohr Sur., A-45, dry, TD 3,780 ft.

Milam County: R. B. Paxson, et al, 1 M. M. Camp, et al, J. J. Acosta Sur., dry, TD 2,076 ft.

San Patricio County: Phillips Petroleum Co. 1 Mrs. Sally Flynn, Sec. 55, Pauls Subd. of Coleman Fulton Pasture Co., dry, TD 11,016 ft.

Republic Natural Gas Co. 6 John Hancock Mutual Life Insurance Co., T. T. Williamson Sur., A-151, dry, TD 6,013 ft.

H. R. Smith & F. William Carr 1 Medican Professional Bldg. Corp., G. W. Egery Sur., dry, TD 10,015 ft.

Starr County: Eugene Garner Drilling Contractor 1 Antioco Munoz, et al, El Javali Grant, dry, TD 2,302 ft.

H. G. Watson & Precision Prospecting, Inc., 1 J. D. Brock, B&B Oil Co. Subd., Block 2, Porc. 86, dry, TD 2,040 ft.

H. G. Watson & Precision Prospecting, Inc., 1 Valley Brick & Tile Co., Porc. 86, dry, TD 1,710 ft.

Travis County: Terra-Mag 1 A. R. Parsons, Gordon Jennings Sur., dry, TD 1,180 ft.

Webb County: The Chicago Corp. 1 Bruni Estate, John H. Gibson Sur. 117, A-1239, dry, TD 2,976 ft.

O. W. Killam 1 Garcia Heirs, Block 27, Sur. 592, Los Ojuelos Grant, dry, TD 2,679 ft.

Zapata County: John F. Camp & Sons 1 Hector Vela, Sec. 5, T&NO Sur., dry, TD 3,252 ft.

Permian Basin

Martin County Wildcat Reports Good Oil Shows

MIDLAND.—Good shows of oil have been reported in a Martin County wildcat that may become an important northern step in the long trend of Spraberry fields.

Sinclair Oil & Gas Co. 1-A Lester, in NW NE 29-36-T3N-T&P Survey, lies about midway between, and a little to the left, of a line between the northeast Midland Spraberry fields and the Spraberry pool of Dawson County.

At last report the well had top of the Spraberry at 7,245 ft. First drill-stem test from 7,253-7,353 ft. recovered 150 ft. of gas-cut mud. Operators then cored ahead to around 7,360 ft., recovering sandy shale with scattered oil shows.

A 1-hour test at 7,320-79 ft. had 150 ft. of gas-cut mud and a core from 7,397-7,415 ft. recovered further shaly sand with good shows of oil. It was coring ahead.

In south-central Martin County, Sinclair 1 Dickenson cored 46 ft. of sand and shale, with bleeding oil in the sand, from 8,823-69 ft. The section was identified as the Dean sand of the lower Permian. Some geologists prefer to call it the lower Spraberry. A drill-stem test was to be run to 8,869 ft., total depth.

Blackwood & Nichols Co. 1 Stimson & Burley, Pennsylvanian wildcat south and slightly east of the Glass field, recovered 315 ft. of slightly gas-cut mud on a 1-hour test at 10,616-10,712 ft. It was drilling ahead near contract depth at 10,734 ft. Top of the Pennsylvanian was 10,507 ft., on elevation of 2,856 ft.

W. W. West 1 Mittel, Schleicher County Pennsylvanian discovery northwest of the Hulldale field, and separated from it by two dry holes, completed for 582 bbl. of oil a day. The flow was through 18/64-in. choke from pay at 6,317-37 ft.

East of the Hulldale area, Hiawatha Oil & Gas Co. 1 Harkey developed 3,480 ft. of heavily oil-cut mud and 1,052 ft. of salt water on a drill-stem test in Canyon limestone at 4,832-4,982 ft. Gas surfaced in 45 minutes and the well unloaded after 300 ft. of drill pipe had been pulled. Top of the Canyon was placed at 4,660 ft., on elevation of 2,430 ft. It was drilling ahead on a 6,500-ft. contract.

Magnolia Petroleum Co. continued testing at 1 Tom Peay, Andrews County Wolfcamp discovery. The well flowed 46 bbl. of oil in 8 hours through ¾-in. choke and later swabbed and flowed 210 bbl. of oil in 16 hours.

In northwest Dawson County, El Tee Oil Co. 1-96 Briley, Ellenburger exploration, developed clean oil on drill-stem test of the Pennsylvanian reef. Corrected top of the reef was 8,750 ft., and minus 5,479 ft. Test was run from 8,602-41 ft. and tool was open 3 hours. Gas came to the top in 20 minutes. Recovery in the pipe was 4,030 ft. of clean oil, plus some 400 ft. of salt water. Some of the pipe was said to have unloaded while coming out. Operators ran electrical surveys, then set casing on bottom at 8,641 ft. and were to perforate for production tests. Nearest Canyon production is in south Terry County.

Spartan Drilling Co. 1-A Scharbauer, east outpost to the Parks Pennsylvanian field of Midland County, recovered 1,523 ft. of 44-gravity oil on a drill-stem test at 10,288-10,311 ft. It was drilling ahead.

WEST TEXAS (DISTRICTS 8 AND 7-C) SUCCESSFUL WILDCATS

Andrews County: Kerr-McGee Oil Co., Inc. 1-B University, 23-11-University Lands, TD 9,296 ft., PB 8,014 ft., elev. 3,322 ft., Wolfcamp 7,956 ft., IP flowed 232 bbl. 43°-gravity oil a day, 14/64-in. choke, GOR 1,600 cu. ft., TP 625 psi.

Borden County: Superior Oil Co. and Intex 15-535 W. H. Jones, 535-97-H&TC, TD 8,195 ft., elev. 2,723 ft., Mississippian 8,173 ft., IP flowed 293 bbl. 41°-gravity oil a day, ¼-in. choke, TP 260 psi., GOR 645 cu. ft.

Glasscock County: Ashland Oil & Refining Co. 1-3 Davenport, 3-37-5s-T&P, TD 7,045 ft., elev. 2,727 ft., Spraberry pay 6,950 ft., IP flowed 387 bbl. 37°-gravity oil a day, ½-in. choke, TP 120 psi., GOR 763 cu. ft.

Sohio Oil Co. 1-A R. S. Davenport, 14-37-5S-T&P, TD 6,978 ft., elev. 2,721 ft., Spraberry 6,920 ft., IP flowed 178 bbl. 40°-gravity oil a day, ½-in. choke, TP 60 psi., GOR 690 cu. ft.

Pecos County: Helmerich & Payne, Inc. 1-F Lowery & Wilson, 19-2-TCRR, TD 2,019 ft., pay 2,000 ft., IP pumped 59 bbl. 34°-gravity oil a day.

Reagan County: Sohio Petroleum Co. 1 E. P. Williams, 19-36-5S-T&P, TD 6,850 ft., elev. 2,711 ft., Spraberry 6,806 ft., IP flowed 605 bbl. 39°-gravity oil a day, 42/64-in. choke, TP 180 psi., GOR 1,100 cu. ft.

Runnels County: Mid-Continent Petroleum Corp. 1 B. R. Thetford, Wharton CSL, A-499, TD 4,229 ft., Morris gas sand 3,682-3,715 ft., IP 8,277,000 cu. ft. gas a day.

Upton County: Sohio Petroleum Co. 1 A. P. Hill, 2-K-D&SERR, TD 12,476 ft., PB 7,110 ft., elev. 2,720 ft., Spraberry 7,050 ft., IP flowed 686 bbl. 39°-gravity oil a day, ½-in. choke, TP 250 psi., GOR 1,082 cu. ft.

Yoakum County: York & Harper, Inc. 1 J. E. Wright, 13-D-J, H. Gibson, TD 6,074 ft., elev. 3,560 ft., Glorietta 5,890 ft., IP flowed 354 bbl. 27°-gravity oil a day, ½-in. choke, GOR 265 cu. ft., TP 50 psi.

WEST TEXAS (DISTRICTS 8 AND 7-C) WILDCAT FAILURES

Concho County: Rock Hill Oil Co. 1-B McIver, 336-72-T&NO, dry, TD 1,451 ft.

Crane County: Stanolind Oil & Gas Co. 1-A McGee, 30-B25-PSL, dry, TD 3,670 ft.

Val Carroll Oil Co. 1 University Lands, 27-45-University Lands, dry, TD 1,600 ft., San Andres 1,480 ft.

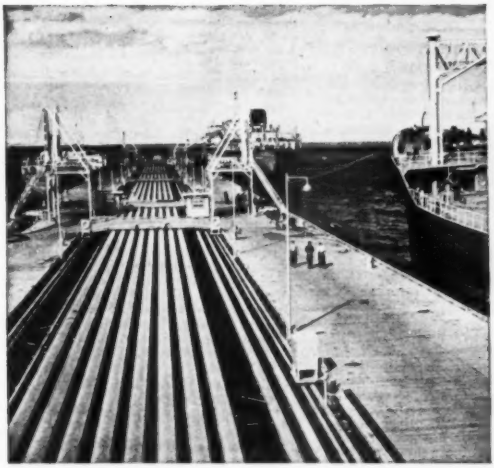
Howard County: Shell Oil Co. 1-C E. T. O'Daniel, 29-27-H&TC, dry, TD 8,917 ft., elev. 2,371 ft., Spraberry 4,775 ft., Ellenburger 8,870 ft.

King County: Continental Oil Co. 3 M. A. Martin, 174-F-H&TC, dry, TD 6,346 ft., elev. 1,958 ft., TD in Strawn limestone.

Pecos County: Gulf Oil Corp. 1 Brown Oil & Royalty Co., 77-194-GC&SF, dry, TD 7,315 ft., elev. 2,322 ft., McKee 6,160 ft., Ellenburger 6,905 ft.

Hunt Oil Co. 32 Elsimore Royalty Co., 91-D-GC&SF, dry, TD 1,113 ft.

Oil Transport and Services



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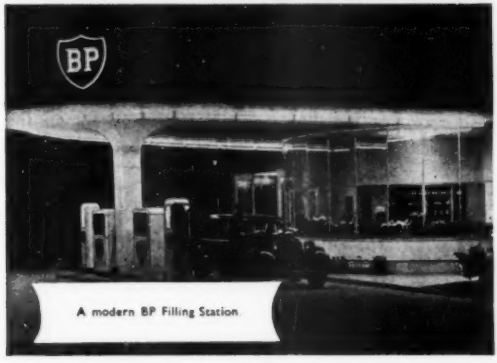

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Runnels County: G. W. Strake 2 H. Davenport, J. J. Ximinez Sur. 265, dry, TD 4,400 ft., elev. 1,845 ft., Swastika 2,466 ft., Gardner 4,013 ft., Caddo 4,350 ft.

Sutton County: Hiawatha Oil & Gas Co. 1 Joe Vanderstucken, 67-7-TW&NG, dry, TD 5,624 ft., elev. 2,224 ft., Strawn 4,190 ft., Ellenburger 5,390 ft.

Winkler County: Cities Service Oil Co. 1-D Scharbrough, 6-C22-PSL, dry, TD 3,824 ft.

Yoakum County: B. A. Ray 1 Fillingim, 711-D-Gibson Sur., dry, TD 5,195 ft., San Andres 4,560 ft.

SOUTHEASTERN NEW MEXICO

HOBBS.—The Texas Co. 1-AR State, Devonian discovery north of the Gladiola field, was opened after being shut in for several days and made a flow of 220 bbl. of new oil in 20 hours through 19/64-in. tubing choke. Operators had considered installing pumping equipment but at last report it was believed the well would continue flowing steadily. On the test, packer was set at 11,478 ft.

East of the Lovington San Andres field of Lea County, Tide Water Associated Oil Co. 1-U State, 4-17s-37e, acidized the Pennsylvanian in open hole from 11,140-11,200 ft. The well was swabbed, then kicked off and flowed 269 bbl. of oil in 10 hours through 1-in. opening. Following that it made 119 bbl. of oil in 15 hours through $^{3}/_{8}$-in. choke.

The 1-U State is the second well and southeast offset to Tide Water's 1-PD State which completed early this for 722 bbl. of oil from pay at 11,080-11,100 and 11,139-59 ft. Tide Water's second well had been drilled to 11,627 ft., 17 ft. into the Mississippian.

South of Gladiola, Gulf Oil Corp. 1-J Lea-State, 12-13s-37e, recovered salt water on a 1-hour test in the Permo-Pennsylvanian from 9,688-98 ft. It was drilling ahead.

North of the Denton area, Phillips Petroleum Co. 1 Fort, 34-15s-37e, prepared to drill ahead after running a 2-hour drill-stem test in the Devonian at 12,582-12,632 ft. Recovery was 33 bbl. of water blanket, cut with oil and gas, plus 42 bbl. of 45°-gravity oil. Top of the Devonian was 12,582 ft.

SOUTHEAST NEW MEXICO WILDCAT FAILURE

Roosevelt County: Goldston Oil Corp. 1-A Lambrith-State, 36-5s-32e, dry, TD 8,297 ft., elev. 4,436 ft., Glorietta 4,270 ft., Abo 6,550 ft., Wolfcamp 7,296 ft., Mississippian 7,864 ft., pre-Cambrian 8,040 ft.

Michigan

Extension Appears Certain For Rose City Richfield Pool

MOUNT PLEASANT.—Rose City Richfield oil pool, Ogemaw County, appeared to have been extended still further along the northeast flank as a pay, which showed for almost certain commercial completion, was logged at Don Karcher 1 Hegeman, NW NW NE 34-24n-2e, Foster Township. As a result of the good natural showing at 1 Hegeman, operator immediately staked two new offsets for early drilling and Superior Oil Co. staked another close-in location.

The 1 Hegeman was bottomed out in the Richfield at 4,043 ft. Well showed 2,200 ft. of free oil natural at the total depth in 18 hours. First oil, a bailer an hour, was logged at 3,880-86 ft. At 4,009 ft. well showed 700 ft. of free oil in 10 hours. An increase in oil and gas was logged at 4,009-25 ft. Well flowed and swabbed 23 bbl. of oil through the casing on test late this week.

The 1 Hegeman is located about 1½ miles south of a good completion by Muskegon Development Co. which was recently completed in Section 29-24n-2e. This new area parallels the original Rose City development and may connect, at least in spots, with further drilling. These two important producers are still nearly a mile north by east from the main body of the developed Rose City pool.

The two locations staked this week by Karcher were the east 40-acre offset, NW SW SE 34-24n-2e, and the north 40-acre offset, NW SW SE 27-24n-2e. Superior Oil Co.'s stake was set in NW SW SW 27-24n-2e to the west and north of the 1 Hegeman.

MICHIGAN SUCCESSFUL WILDCAT

Newaygo County, Croton Township: Augie Busk 1 Hatchew Comm., E½ SW NW 29-12n-11w, Marshall 916 ft., 1,708,000 cu. ft. day, TD 919 ft.

MICHIGAN WILDCAT FAILURES

Allegan County, Heath Township: R. T. Jones 1 U. S. Government, SW SW SE 20-3n-14w, Traverse 1,396 ft., dry, TD 1,456 ft.

Arenac County, Deep River Township: J. E. Bauer 1 Navidonski, NW NW SW 27-19n-4e, Dundee 2,735 ft., dry, TD 2,910 ft.

Clare County, Garfield Township: J. E. Bauer 1 Loker et al, SE NE NE 7-17n-6w, Dundee 3,915 ft., dry, TD 3,997 ft.

Muskegon County, Cedar Creek Township: Wigle Oil & Gas Co. 1 Koviak, NE SE SW 3-11n-15w, Traverse 1,978 ft., dry, TD 1,996 ft.

Van Buren County, Columbia Township: Dale M. Leonard 1 Brown, NE NE SE 20-1s-15w, Traverse 1,150 ft., dry, TD 1,529 ft.

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North Central Texas

Pennsylvanian Reef Strike Indicated for Nolan County

WICHITA FALLS.—Seaboard Oil Co. of Delaware had a prospective Pennsylvanian reef discovery in southeast Nolan County.

The 1 Hanks in 28-Z-T&P Survey, 7 miles northeast of Blackwell, topped the reef at 4,579 ft., minus 2,098 ft., and ran the test from 4,584-4,609 ft., total depth. Gas reached the surface in 15 minutes and oil in 65 minutes, making a flow estimated at 15 bbl. hourly. Drill pipe unloaded while being pulled. Operators prepared to run casing to bottom and make production tests.

Continental Oil Co. was reported to have an interest in the discovery and to hold leases in the area.

In Foard County, The Texas Co. 1 Shultz, wildcat 2 miles southeast of Margaret, was drilling ahead at 5,591 ft. after a drill-stem test from 5,517-77 ft. recovered salt water. The section was not identified.

A two-pay discovery southeast of Woodson in Throckmorton County has been completed by Warren Oil Corp. Warren 1 G. Williams, J. H. Williams Survey, flowed 84 bbl. of oil in 6 hours through 18/64-in. choke. Second pay was the Mississippian which produced 107 bbl. of oil in 3½ hours through 20/64-in. choke.

British American Oil Co. 1 Johnson, Foard County wildcat 20 miles northwest of Crowell, was reported flowing an estimated 6 bbl. of oil an hour from perforations in the Caddo around 6,175 ft.

In Clay County, Continental Oil Co. 5-C Heard had top of the Ellenburger at 6,475 ft. and was preparing to core ahead from 6,480 ft.

South of Henrietta, Gulf Oil Corp. 1 O. D. Worsham had total depth at 6,930 ft. and was pulling pipe.

Continental Oil Co. 2-A Mrs. Golightly, 7 miles southeast of Montague, flowed 81 bbl. of oil in 2 hours on a drill-stem test in Strawn sand from 5,784-5,802 ft. Oil came to the surface in 25 minutes.

NORTH CENTRAL TEXAS (DISTRICTS 9 AND 7-B) SUCCESSFUL WILDCATS

Clay County: Deep Rock Oil Corp. 1 Moore Estate, J. Diaz Sur., 2 mi. NE Newport, TD 6,891 ft., perforated Strawn 3,976-93 ft., IP flowed 125 bbl. 43°-gravity oil a day, 16/64-in. choke.

Jack County: Magnolia Petroleum Corp. 1 R. E. Voyles, SPRR Sur., A-582, 1 mi. SE Antelope, TD 3,920 ft., pay 3,790 ft., IP pumped 32 bbl. 36°-gravity oil a day.

Stephens County: H. E. Baker 1 C. O. Haskins, 32-6-T&P, TD 1,838 ft., pay 1,833 ft., IP pumped 10 bbl. 40°-gravity oil a day.

S. D. Johnson 1 J. R. Coody, 47-5-T&P, 2 mi. SW Caddo, TD 2,215 ft., pay 2,164 ft., IP pumped 3 bbl. 39°-gravity oil.

Taylor County: Warren Oil Corp. 1 M. G. Reed, Sec. 442, G. Hancock Sur., 3½ mi. S Ovalo, TD 4,303 ft., elev. 2,000 ft., Gardner pay 4,274 ft., IP flowed 169 bbl. 39°-gravity oil a day, 16/64-in choke, TP 150 psi., GOR 510 cu. ft.

Throckmorton County: Woodson Oil Co. 3-Q R. A. Brown, Sec. 202, BBB&C Sur., TD 5,315 ft., elev. 1,544 ft., pay 4,715 ft., IP flowed 176 bbl. 40°-gravity oil in 6½ hr., 20/64-in. choke, TP 500 psi., GOR 920 cu. ft.

Wilbarger County: Johnson & Johnson 1 R. L. Castlebury, 66-14-H&TC, TD 1,529 ft., pay 1,517 ft., IP pumped 22 bbl. 38°-gravity oil.

Young County: Lebus Bros. 1 H. O. Prideaux, A. McMillen Sur., A-198, 5 ci. N Markley, TD 3,680 ft., elev. 1,139 ft., perforated 2,998-3,004 ft., IP pumped 65 bbl. 41°-gravity oil a day.

NORTH CENTRAL TEXAS (DISTRICTS 9 AND 7-B) WILDCAT FAILURES

Archer County: L. T. Burns 1 G. W. Baker, TE&L Sur. 1,897, dry, TD 4,200 ft.

B. G. Byars 1 Virgil Seay, Blk. 56, Harris Subd., dry, TD 3,355 ft.

W. B. Hamilton 1 Joy Graham, J. Weaver Sur., dry, TD 1,180 ft.

W. B. Hamilton 2 Graham Estate, B. C. North Sur., A-327, dry, TD 1,129 ft.

Brown County: McLean-Roberts 1-D Cox & McInnis, W. A. Townsend Sur., dry, TD 1,250 ft.

Callahan County: Woodson Oil Co. 1 Owen-George, Sec. 20, D&DAL Sur., dry, TD 2,378 ft.

Clay County: L. T. Burns 1 J. B. Dale, TE&L Sur., A-438, dry, TD 5,006 ft.

Konrad Sztykgold 1 Bert Copp, 74-A-156-Grayson CSL, dry, TD 4,765 ft.

Cooke County: Harvey Drilling Co. 1 Montgomery, J. B. McClyman Sur., A-735, dry, TD 2,667 ft.

S. D. Johnson 1 J. E. Selz, 4½ mi. NW Pilot Point, dry, TD 1,770 ft.

Fisher County: General Crude Oil Co. 1 Ruby Cooper, 115-1-H&TC, dry, TD 6,161 ft., Swastika 3,890 ft., Strawn 5,242 ft., Ellenburger 6,090 ft.

Haskell County: E. K. and E. M. Burt et al 1 H. M. Michels, 132-45-H&TC, dry, TD 4,955 ft.

Jack County: Panhandle Producing & Refining Co. 1 Mrs. C. Connor, A. W. Jones Sur., A-971, dry, TD 5,440 ft., elev. 1,000 ft., Caddo approximately 4,591 ft.

Jones County: Grisham-Hunter Corp. 1 J. N. Hatfield, M. Northington Sur. 270, dry, TD 3,207 ft., elev. 1,730 ft., Flippen sand 3,155 ft.

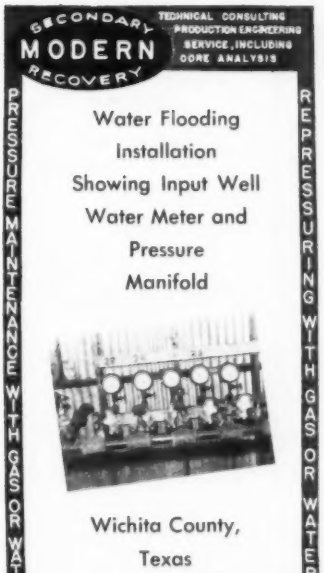
Parker County: I. Dee Campbell 1 Elmo Coon, 299-A-1,491-T&P, dry, TD 1,033 ft.

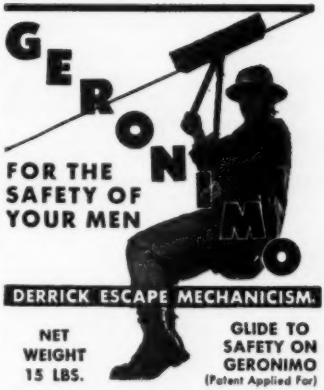
Kingwood Oil Co. 1 Agnes Community Unit, 123-A-1,370-T&P, dry, TD 4,052 ft.

Shackelford County: Lankford & Miller 1 J. H. Grimes, 87-12-T&P, dry, TD 975 ft.

Stephens County: W. D. Brookover 1 J. S. Speers, 28-6-T&P, dry, TD 1,045 ft.

Deep Rock Oil Corp. 1 F. M. Tomlin, Sec.





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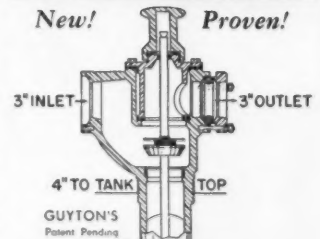

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William Moss 1 Wilson, TE&L Sur. 2,067, dry, TD 2,156 ft.

Stonewall County: P. R. Rutherford 1-A M. A. Baldwin, 49-D-H&TC, dry, TD 6,514 ft., elev. 1,765 ft., Caddo 6,010 ft., Bend 6,145 ft., Ellenburger 6,310 ft.

Wilbarger County: Jack E. Dennison 1 W. T. Waggoner estate, 14-49-H&TC, dry, TD 1,943 ft.

Young County: F. L. Christie 1 Ann Brogden, W. E. Byrd Sur., A-1,374, dry, TD 2,170 ft.

Mississippi

Wildcat Cores Oil Show in Escambia County, Alabama

JACKSON.—In Escambia County, Alabama, Stanolind Oil & Gas Co. cored a show of oil from the Lower Tuscaloosa in 1 F. A. Steward, SE SE 11-1n-8e, wildcat located approximately 39 miles east of the nearest production at South Carlton field.

Drilling break at top of Lower Tuscaloosa was encountered at 5,938 ft. Operator ran a 45-minute drill-stem test at 5,945-48 ft. with recovery being salt water. Another test was conducted at 5,938-41 ft., using ⅝-in. bottom and ¼-in. top chokes and 1,000 ft. of water cushion. Tool was open 45 minutes and recovery was 30 ft. of 25°-gravity oil, water cushion, 90 ft. of oil-cut mud, 115 ft. of brackish water, and 30 ft. of salt water cut with oil.

Although this test is not enough to establish commercial production, it is significant in that this is the farthest east in Alabama that a good show of oil has been found. If the well does produce in commercial quantities, it will establish the fourth oil field for Alabama.

Humble Oil & Refining Co. has cored a thin oil sand in Sandy Hook gas-condensate field at 1 Sandy Hook Gas Unit 15, 18-1n-17w, Marion County, Mississippi. Oil sand was noted at 9,036-40 ft. Operator ran electric log and is preparing to test the well. It is not known whether or not the oil sand will be tested, since the well is reported to have cored sufficient gas sands for a commercially productive well.

Humble has staked location for its second Lower Tuscaloosa test on Gillsburg prospect in Amite County, Mississippi. Test is 1 H. C. Spears, C SE SW 27-1n-6e, and has a projected depth of 12,500 ft. This well is 1½ miles northeast of Humble 1 W. A. Stockard, which tested oil in non-commercial quantities at 11,669-12,052 ft.

Sun Oil Co. is preparing to complete its new Wilcox discovery located 1 mile north of South White Apple field, Franklin County, Mississippi. The well, 1 Seab, 45-6n-1e, was swabbed for 65.71 bbl. of oil during the last 12 hours of a 3-day drill-stem test, and is now cleaning into pits through 3/16-in. choke. Production is through perforations at 6,423-26 ft.

MISSISSIPPI WILDCAT FAILURES

Adams County: Sinclair Oil & Gas Co. 2 Hogue Estate, 13-5n-4w, dry, TD 7,494 ft.

Austin-Stewart-R. H. Alagood 1 L. S. Stanton, 10-6n-3w, dry, TD 6,510 ft.

Jefferson County: Lyle Cashion Co. 1 Louis Guedon Heirs, 24-9n-2w, dry, TD 6,111 ft.

G. A. Clements-G. G. Stanford 1 O. T. Guice, 40-8n-2e, dry, TD 6,500 ft.

Washington County: Jack Anderson, Trustee, 1 C. C. Trotter, 35-16n-8w, dry, TD 3,917 ft.

Jack Anderson, Trustee, 1 Q. N. Quinn, 18-15n-8w, dry, TD 3,667 ft.

Wayne County: Harris & Payne-George Harrison-L. Cashion Co. 1 Sam and Ollie Mauldin, 21-9n-6w, dry, TD 5,119 ft.

The California Co. 1 Board of Supervisors, 16-6n-6w, dry, TD 7,800 ft.

ALABAMA WILDCAT FAILURE

Monroe County: Gulf Refining Co. 1 J. E. Hetherington, 2-7n-6e, dry, TD 6,525 ft.

Oklahoma

Springer Sand Produces In Garvin County Test

ANOTHER new Springer sand pool is in the making in western Garvin County, near the northeast corner of Stephens County, where Vickers Petroleum Co. is testing its 1 Parks, SE NW SE 6-2n-3w. Operators perforated casing at 9,668-98 ft., opposite a zone in which a previous drill-stem test got a strong gas blow and recovered 395 ft. of oil and 360 ft. of oil and gas-cut mud. Initial swabbing tests produced an average of 4 bbl. of oil per hour. Later, following a Hydrafrac application, the well swabbed 75 bbl. in 12½ hours. Bottom of the casing is at 9,800 ft. in hole drilled to 10,018 ft. Top of the sand was logged at 9,669 ft. Location of the well is about 3 miles west of the Panther Creek pool in the wedge area of the sand flanking the Golden Trend. (See page 137).

Confirmation of the new Springer sand pool, opened last month, by Stephens Petroleum Co. north of Fox and west of the Sholem Alechem field, in Carter County, is indicated by results of a drill-stem test by Stanolind Oil & Gas Co. at its 1 McDaniel, SE NE NE 9-2s-3w. This well, a northeast offset to the discovery well, 1 Haas, flowed oil at an estimated rate of 20 bbl. per hour during the test, made of an interval at 6,226-74 ft. Oil was at the surface within 1 hour and 45 minutes and

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flowed the remaining 15 minutes the tester was open. Gravity of the oil was 43.5°. The discovery well produces from the Humphreys zone at 6,408-18 ft. and 6,434-54 ft.

Davon Oil Corp. and associates are proving either the discovery of a new Layton sand pool or a mile extension of the East Crescent pool at its 1 Derr, NW NE NE 15-17n-3w, Logan County. The well flowed 188 bbl. of oil through 24/64-in. choke during a 24-hour production gage. Flowing pressure was 300 psi. on the tubing and 650 psi. on the casing. Sand was logged at 4,646-74 ft. Total depth is 4,700 ft. with casing on top of the sand. Location is northeast of the East Crescent pool, which also produces from Layton sand.

Midstates Oil Corp. 1 Miller, NW NW NE 20-28n-2w, east offset to the operator's 1 Harris, discovery well of the Northwest Doe Creek pool in northwestern Kay County, got a good flow of oil and gas in drill-stem test of Simpson sand (producing zone of the discovery well) at 4,600-29 ft. If it makes a well, it will confirm the discovery made by the first well. Two other tests have been drilled since the discovery well was completed last April, but one, a northwest offset, was dry, and the other, a northeast offset, also a failure in the Simpson, was completed in the Mississippian.

Another recent northern Kay County discovery, the East Chilocco pool, also is getting a confirmation well. Atlantic Refining Co. 2 Widener, SW NE NW 20-29n-3e, east offset to the discovery well (Dean Witter 1 Widener), recovered 440 ft. of oil and 150 ft. of mud-cut oil in a 60-minute drill-stem of Bartlesville sand (producing zone of the discovery well) at 3,205-19 ft. Hole, drilled to 3,221 ft., has casing run to 3,210 ft. for completion. The pool was opened last May. The discovery well flowed initially 400 bbl. in 21 hours but later was put on the pump making 42 bbl. of oil and 70 bbl. of water per day.

OKLAHOMA SUCCESSFUL WILDCATS

Creek County: Delta Petroleum Co. et al 1 Walker, SW NW NE 16-14n-7e, pumped 157 bbl. 36°-gravity oil from second Wilcox at 3,968-89 ft., TD 3,989 ft.

Major County: Superior Oil Co. of California 21-14 Smithson, NE NW NW 14-22n-11w, 3½ mi. N Ringwood pool, flowed 11 bbl. 47.5°-gravity oil from Manning at 6,727-83 ft. through tubing, elev. 1,345 ft., Oswego 6,260 ft., Manning zone 6,725-83 ft., TD 6,827 ft.

Payne County: W. H. Martgan 1 Manning, NE NE SW 20-18n-6e, flowed 40 bbl. 38.5°-gravity oil from Redfork at 3,056-62 ft., TD 3,110 ft.

Washita County: United Carbon Corp. 1 Z. Music, NW SE 28-10n-20w, flowed 111 bbl. 61.8°-gravity oil and 2,980,000 c.f.g. from Hoxbar at 9,684-9,722 ft. and 10,456-74 ft., TD 11,075 ft., PB 10,538 ft.

OKLAHOMA WILDCAT FAILURES

Coal County: W. A. Delaney, Jr., et al 1 Smith, SE NE SW 29-1n-9e, dry, TD 7,093 ft.

Cotton County: Erle P. Halliburton 1 Schneeberger, SE SW NE 12-1s-10w, dry, TD 2,436 ft.

Creek County: Gulf Oil Corp. 1 J. A. Chapel, NW NE NW 33-19n-8e, dry, TD 3,364 ft.

Harper County: Zephyr Petroleum Co. 1 Moberly, NE NE 33-26n-22w, dry, TD 6,737 ft.

Lincoln County: J. L. Crawford 1 E. Seaba, NE NE NW 19-16n-5e, dry, TD 4,220 ft.

Love County: Miami Operating Co., Inc., 1 McAllister Church, SW NW NW NE 1-6s-1e, dry, TD 2,410 ft.

Marshall County: R. J. Caraway 1-A Rutherford, SW NW SE 32-4s-6e, dry, TD 2,004 ft. Hole caved, junked.

Murray County: W. F. Collins 1 Rosa J. Franks, SW NE NW SE 1-1n-3e, dry, TD 406 ft.

Okfuskee County: An-Son Petroleum Corp. 1 Cozine, SW NW SE 34-13n-8e, dry, TD 3,618 ft.

Pontotoc County: Paul Kollsman 1 Della Mae Miller, NE SE NW 32-3n-8e, dry, TD 4,114 ft.

Pottamatomie County: Stephens Petroleum Co. 1 Fawcett, SE NW SE 15-11n-5e, dry, TD 4,908 ft.

Tillman County: The Texas Co. 1 E. G. Reese, SE NE NW 23-1s-18w, dry, TD 4,269 ft.

Stanolind 1 Watson, NW NW NE 26-4s-15w, dry, TD 4,174 ft.

California

Fault-Block Pool Discovery Revives Signal Hill Drilling

LOS ANGELES.—The Signal Hill area of Long Beach is again experiencing one of its periodic drilling flurries. The latest activity, six rigs now drilling, is on the extreme northern edge of the city where Golden Dome Oil Co. last April opened a new fault-block pool at 6,650-7,300 ft. Since then six additional producers have been completed, all for initial productions of 600 to 1,400 bbl. daily.

Located in the vicinity of California and Wardlow streets in Sections 18 and 19-4s-12w, the pool may not be extensive but it is expected to be highly productive. Hancock Oil Co., in a partnership with General Petroleum Corp., is the most active operator in the new play with four rigs at work. Golden Dome and R. W. Jerman, Inc., each have one rig drilling.

In Orange County's San Joaquin Hills area, Shell Oil Co. was still attempting to establish shallow production in its 44-166 Irvine One. Drilled to 9,826 ft. and plugged back to 1,620 ft., the wildcat was reported pumping through perforations at 1,002-1,615 ft. Location is in projected NW Section 11-7s-9w.

The Texas Co., which in recent months has been one of the State's leading wildcatters, before the first of the year is expected to start the first of a series of wildcats in Imperial Valley. The valley is a considerable distance from existing California fields, but some drilling has been done. For the most part the major companies have tended to stay clear. Texaco reportedly has approximately 200,000 acres under lease there in blocks beginning near Palm Springs and extending southward toward the Mexican border.

In the San Joaquin Valley region the deep-zone test being drilled by Standard Oil Co. of California in the old Buena Vista Hills field was attracting attention. The test, 552 27-B in Section 27-31s-23e, was last reported drilling below 5,321 ft. with the objective of picking up production in the Stevens zone. According to scout reports, two formation tests at shallower depths were highly encouraging.

Outcome of two wildcats in the Camden area of Fresno County shortly will be known. In Section 6-17s-20e, Santa Fe Drilling Co. halted drilling at its 1 Dyson at 6,576 ft. to run an electrical log after reportedly topping an oil sand at 6,093 ft. In Section 4 J. V. Dougherty & Associates also were logging the 38 "Well" after reaching a depth of 6,550 ft.

The first wildcat is about 1¼ miles northwest of the Von Glahn discovery completed in a 6,100-ft. sand last June. The second test is about ¾ mile northeast of the discovery. A south offset to the discovery was dry.

CALIFORNIA WILDCAT FAILURES

Kern County, Edison area: L. A. Garner 1 Barneson, 12-30s-29e, dry, TD 3,500 ft., elev. 730 ft.

Tejon Creek area: M. G. Kovaleski 1 Flowing Gold, 34-12n-18w, dry, TD 909 ft., elev. 917 ft.

Trico area: H. H. Magee 1 Powell, 20-25s-24e, dry, TD 4,500 ft., elev. 241 ft.

Kings County, Avenal area: Reef Ridge Oil Co. 1 "Well," 10-23s-16e, dry, TD 1,803 ft., elev. 2,250 ft.

Pyramid Hills area: Elva McPhaill & Roy Gill 1 McPhaill, 14-24s-18e, dry, TD 5,009 ft., elev. 444 ft.

Los Angeles County, Paradise Ranch area: Bishop Oil & Exploration Co. 1 Mary Austin, 28-6n-17w, dry, TD 3,646 ft., elev. 2,970 ft.

Monterey County, Reliz Canyon area: The Texas Co. 1 Gould, 9-19s-6e, dry, TD 6,997 ft., elev. unreported.

Los Lobos area: Jergins Oil Co. 2 Aurignac, 9-23s-10e, dry, TD 3,961 ft., elev. 852 ft.

San Ardo area: Jergins Oil Co. 251-35 Lanigan, 35-22s-10e, dry, TD 2,873 ft., elev. 690 ft.

San Luis Obispo County, Mason Canyon area: General Petroleum Corp. 22-34 Hillman - Darnell, 34-25s-14e, dry, TD 7,716 ft., elev. 1,370 ft.

Templeton area: Gene Reid Drilling, Inc., 1 Heilman, 35-27s-12e, dry, TD 4,239 ft., elev. 1,011 ft.

Santa Barbara County, Carpinteria area: D. S. Fletcher 1 Catlin-Fletcher, 33-4n-25w, dry, TD 1,560 ft., elev. 40 ft.

Solano County, Van Sickle Island area: Brazos Oil & Gas Co. 1 Concord Gun Club, 33-3n-1e, dry, TD 7,003 ft., elev. unreported.

South Louisiana

Magnolia Completes Lake Pelto Wildcat as Gasser

NEW ORLEANS. — Magnolia Petroleum Co. A-1 State Lease 794, wildcat in Block 20, Lake Pelto, off Terrebonne Parish, has been completed as a gas discovery. Through perforations at 8,182-92 ft., the well flowed 22,300,000 cu. ft. of gas daily on open flow. Shut-in pressure was 3,319 psi. A previous gage of 2,545,000 cu. ft. plus 22.3 bbl. of distillate was reported on the well. Gage was made through 12/64-in. choke.

Oil production has been confirmed at Cowpen Creek field, Beauregard Parish, after three dry holes were drilled in confirmation attempt. Fidelity Oil & Royalty Co. 5 Edgewood Land & Logging Co., 17-6s-9w, flowed 119 bbl. of oil per day on basis of a 15-hour test. Production is through 7/64-in. choke with 1,675 psi. tubing pressure and 1,750 psi. casing pressure.

Magnolia has cemented 7-in. casing at 12,260 ft. at 1 Magnolia-Four C Unit, 32-3s-9w, Beauregard Parish wildcat, and it is reported that the firm will drill ahead to contract depth of 13,500 ft. before testing. The wildcat is approximately 1½ miles north of Burt.

In the same parish, The Texas Co. is drilling below contract depth at 1 Isabel Crawford Logan. Original proposed depth of the wildcat was 11,000 ft. and tools are now below 11,640 ft. No shows have been reported in the venture.

Although official confirmation is lacking, it is reported that Richardson & Bass plan to deepen an old Rapides wildcat to test horizons found productive in Glenmora field. Venture is 1 Heflands, NW SW 21-1s-3w, approximately 6 miles west of Glenmora. The well was abandoned in 1940 at total depth of 9,510 ft.

Northwest of Satori, also in Rapides Parish, Warren Oil Corp. is building roads to location for 1 Raymond Veal, 33-1n-1e. The well will explore the Wilcox zone.

SOUTH LOUISIANA SUCCESSFUL WILDCAT

Plaquemines Parish: Shell Oil Co. 1 State Lease 1961, 18s-18e, TD 10,000 ft., perf. 7,507-11 and 7,516-20 ft., IP: 27 bbl. condensate per day, 11/64-in. choke, TP 2,700.

SOUTH LOUISIANA WILDCAT FAILURES

Pointe Coupee Parish: Sinclair Oil & Gas Co. 1 J. G. Beaud, 3-4s-10e, dry, TD 3,840 ft.

Rapides Parish: Barnet Serio 1 L. R. Provosty, et al, 35-6n-2w, dry, TD 5,892 ft.

Terrebonne Parish: Humble Oil & Refining Co. 1 State Lease 1,835-Lake Merchant, dry, TD 14,000 ft.

Kansas

Purdyville Confirmed by Third Good Oil Producer

ADDITIONAL confirmation of the new Purdyville pool in Hodgeman County, western Kansas, is being given by completion, now under way, of a third producer, Armer & Koplin 3 Schraeder, SW SW NE 3-24-24, which produced at the rate of 42 bbl. of oil per hour during swabbing tests of the pool's Mississippian pay zone, open at 4,685-93 ft.

The new confirmation well is a location east of the pool's second well, M. B. Armer 2 Schraeder, C E½ SE SW 3, completed in July with pay open at 4,664-79 ft. The latter well in turn is a location southeast of the discovery well, I. W. Schraeder, NW SE NW 3, completed last April with pay open at 4,665-83 ft. Drilling now is under way at the pool's fourth test, No. 4, located northwest of the discovery well. Location of the pool is 7 miles southwest of Jetmore.

Indications of a possible new pool, 15 miles from any other production, in southern Kiowa County, have been given by showings encountered by Iron Drilling Co. at its [illegible]er, SW NW NW 23-30-8, 1 mile south of Chivey townsite. Both the Lansing, topped at 3,407 ft. (—1,892 ft.) and the Mississippian, topped at 4,168 ft. (—2,653 ft.) had showings. A 60-minute drill-stem test at 3,858-67 ft. in the Lansing flowed gas estimated at 1,000,000 cu. ft. per day and recovered 270 ft. of oil and water. Another test in the same zone with hole deepened to 3,882 ft. also got gas and in addition flowed oil and water, recovering 600 ft. of oil and water in the breakdown.

Three tests were made in the Mississippian. The first, at the top, taking in an interval at 4,168-87 ft. flowed gas at an estimated rate of 3,140,000 cu. ft. per day. The second, at 4,187-4,213 ft., recovered 135 ft. of heavily oil-cut mud. The third, at 4,223-33 ft., yielded 102 ft. of heavily oil and gas-cut mud. At latest report, operators were drilling ahead in the Mississippian.

Testing is under way at Barnett Drilling Co. 1 Beecher, NW NW NE 6-10-21, prospective discovery well a mile west of the Smith-Denning pool, in southeastern Graham County. Hole filled 2,100 ft. of oil in 6 hours when plug was drilled out in the Arbuckle pay, topped at 3,880 ft. (—1,579 ft.). Total depth is 3,882 ft. The well also had showings in the Lansing-Kansas City section topped at 3,525 ft.

Isern Drilling Co. 1 Krannawitter, SE SW NW 19-12-17, a mile southwest of the Pleasant Ridge pool, in Ellis County, swabbed at the rate of 2½ bbl. of oil per hour while testing Arbuckle lime, topped at 3,672 ft. (—1,544 ft.) and drilled to 3,688 ft.

The Texas Co. has run casing in its 1 Keenan, NW NW SE 24-5-27, prospective disovery well in Decatur County, northwestern Kansas. The well encountered promising oil showings, previously reported, in three horizons, the Topeka, Lansing, and Marmaton. Since then, it has been drilled to a total depth of 3,925 ft. in granite, topped at 3,894 ft. Casing was run through the granite wash section to 3,800 ft. Top of the Topeka was logged at 3,220 ft. (—721 ft.), the Lansing at 3,407 ft. (—908 ft.), and the Marmaton at 3,192 ft.

Rig is being moved in for a test to be drilled in northwestern Wallace County, on the extreme west edge of the state. C. H. Bigsby of Shreveport, La., who has a block of more than 15,000 acres, will be the operator. Location, on his 1 Hill in the C SW SE 36-11-42, is 14 miles northwest of Sharon Springs and 6 miles from the Colorado line. It is 90 miles northwest of the Hugoton gas area. Nearest oil production is the small Goodland pool, 25 miles to the northeast in Sherman County and one of the few widely scattered pools in western Kansas. Only a few scattered tests

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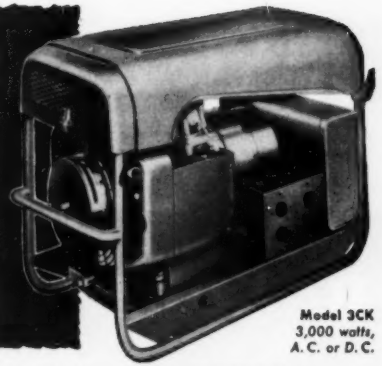

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have ever been drilled in Wallace or adjoining counties.

The Bigsby test is the second rank wildcat operation started in the extreme western tier of counties with the past 2 weeks.

Superior Oil Co. previously announced location for a deep test in Stanton County, several counties to the south. The latter test is 1-A Tucker, SE SW SE 4-29-42. It is 10 miles west of Hugoton gas production and only a short distance from the Colorado line.

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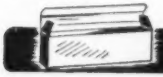

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KANSAS SUCCESSFUL WILDCATS

Phillips County: Lewis 1 Kelly, NE NE SE 23-2s-19w, IP 163 bbl., Lansing-Kansas City 3,458-62 ft., TD 3,568 ft.

Rice County: Buhler 1 Haas, NE NE SE 33-18s-10w, pumped 30 bbl. oil from Sooy, 3,270-80 ft., TD 3,332 ft.

Saline County: Musgrove and Bay 1 Holm, NW NW NW 32-16s-3w, IP 227 bbl., 3,406-12 ft., TD 3,636 ft.

Stafford County: Westgate-Greenland 1 Wetig, NW NW SE 2-22s-14w, IP 677 bbl., Lansing-Kansas City, 3,474-94 ft. and 3,523-43 ft., TD 3,810 ft.

Trego County: Stanolind Oil & Gas Co. 1 Monroe, SE NW SE 36-12s-22w, IP 83 bbl., Arbuckle, 3,962-76 ft., TD 3,983 ft.

KANSAS WILDCAT FAILURES

Barton County: Ash 1 Bieberle "A," SE SE NW 16-19s-11w, dry, TD 3,393 ft.

Butler County: Keener et al 1 Stephens, SE SW NW 17-28s-3e, dry, TD 3,240 ft.

Cowley County: Krow 1 Craig, NE SE NE 33-31s-5e, dry, TD 2,625 ft.

Decatur County: Gore 1 Burns, NE NE NE 16-3s-28w, dry, TD 4,390 ft.

Ellsworth County: Sohio Petroleum Co. and Duke & Woods 1 Brijeska, NW SW SW 32-16s-10w, dry, TD 3,417 ft.

Finney County: Alpine 1 Landgraf, SW SW SE 27-21s-32w, dry, TD 5,040 ft.

Kingman County: Wakefield 1 Bentley, SE SE SW 24-29s-6w, dry, TD 4,625 ft.

Marion County: Loomis and Artnell 1 Svitak, NE NW SE 30-18s-4e, dry, TD 2,840 ft.

Norton County: Gore 1 Leidig, NE NE NE 15-5s-23w, dry, TD 3,752 ft.

Osborne County: Lindas 1 Pfortmiller, C NE NW 7-10s-15w, dry, TD 3,610 ft.

Pawnee County: Vickers 1 Dupree, NE NE SW 13-21s-15w, dry, TD 3,829 ft.

Westgate-Greenland 1 Wiles, NE SE NW 1 23s-15w, dry, TD 4,053 ft.

Pottawatomie County: Allman et al 1 Freidrich, NW NW NW 20-9s-8e, dry, TD 2,305 ft.

Reno County: Skiles 1 Wright, SE SE SE 17-25s-9w, dry, TD 4,362 ft.

Rice County: Solar 1 Sellers, SE NE NE 27-18s-7w, dry, TD 3,441 ft.

Rooks County: Hansen 1 Miller, SW SW NW 18-9s-20w, dry, TD 3,779 ft.

Stafford County: Murfin 1 Schwartz, NE SE SE 26-21s-11w, dry, TD 3,506 ft.

Palmer 1 Gilmore, NE NE NW 33-23s-14w, dry, TD 4,104 ft.

Sumner County: Crawford 1 Lanterback, SW SW SW 33-32s-2w, dry, TD 4,376 ft.

EASTERN NEBRASKA WILDCAT FAILURES

Richardson County: General 1 Meyers, NW SW NW 12-1n-15e, dry, TD 2,360 ft.

Valley 1 Towel, SW SW NW 23-1n-16e, dry, TD 2,448 ft.

Polinsky 1 Mizel, SW SW NE 23-3n-16e, dry, TD 2,666 ft.

Eastern Texas

Franklin County Prospect Testing in Basal Rodessa

DALLAS.—Atlantic Refining Co. 1 Glenn Freeman, Franklin County wildcat 3 miles southeast of Mount Vernon, had oil and salt water in what was tentatively identified as the basal Rodessa.

Operators had cored from 7,090-7,137 ft., recovering 47 ft. of sandy limestone and shale with intermittent shows of oil. The 1-hour test was run between 7,092-7,137 ft., and recovery was 90 ft. clean oil, 90 ft. mud-cut oil, and 90 ft. salt water. Top 9 ft. of above core was said to be sand with good oil shows. It was coring ahead at last report and was to be drilled to the Travis Peak.

Deeper pays for the Walter Fair field of Kaufman County have been indicated at Producers Investment Co. and Ralph Spence 1 F. E. Lumpkin on the west side of the field in the B. S. Newman Survey.

A drill-stem test in the Hill section at 6,296-6,306 ft. recovered 470 ft. of mud-cut oil, although operators said the packer slipped in 5 minutes. It was drilled ahead and found further oil shows at 6,391 ft. A core from 6,396-6,436 ft. found 10 ft. of oil sand with the balance broken sandy lime carrying water.

A drill-stem test with two packers, one at 6,392 ft. and the other at 6,412 ft., recovered 410 ft. of clean oil in 30 minutes.

A. O. Phillips 1 Wilkerson, Woodbine test across the fault line near the Walter Fair field, had total depth at 4,180 ft. and was running casing to perforate and test.

In Wood County W. M. Coats 1 R. J. King, northeast of Quitman, was drilling shale and lime at 5,465 ft.

Hollandsworth Oil Co. 1 Ethel Brogman, east of the Pine Mills townsite, was drilling in shale at 5,905 ft.

EAST TEXAS (DISTRICTS 5 AND 6) SUCCESSFUL WILDCAT

Houston County: Coats & Spence 1 O. M. Rialls, D. McLean Sur., 12 mi. W Grapeland, TD 6,043 ft., elev. 208 ft., perforated sub-Clarksville 5,762-78 ft., IP 1,750,000 cu. ft. gas a day, ¼-in. choke, plus estimated 128 bbl. 60°-gravity distillate, TP 1,320 psi.

EAST TEXAS (DISTRICTS 5 AND 6) WILDCAT FAILURES

Anderson County: John B. Coffee 1 Tom Helm, P. Parker Sur., dry, TD 5,800 ft.

Cherokee County: Wise & Decker Bros. 1 J. N. Vaughn, G. M. Harlow Sur., dry, TD 4,957 ft., Eagleford 4,683-4,700 ft., Woodbine 4,700-16 ft.

Falls County: San Juan Oil Co. 2 Perkins, P. Zarza Sur., dry, TD 752 ft.

Grayson County: Helmerich & Payne et al 1 C. E. Green, H. Stewart Sur., A-1,072, dry, TD 8,314 ft.

Johnson and Powell 1 Brooks, J. McCarty Sur., dry, TD 1,500 ft.

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Hopkins County: Louis E. Ardis 1 F. L. Branon, S. McCulloch Sur., dry, TD 4,859 ft., elev. 520 ft., Georgetown 4,040 ft.

McLennan County: M. S. Kemmerer 2 Eula Holt, R. Simpson Sur., dry, TD 1,127 ft.

Wood County: Cable Tool & Rotary Drilling Co. 1 Matha Ingrim, J. Robbins Sur., dry, TD 5,007 ft., elev. 371 ft., sub-Clarksville 4,255 ft., Woodbine 4,665 ft.

Texas Gulf Coast

Colorado County Wildcat Completed as Oil Pumper

HOUSTON.—Ohio Oil Co. has completed 1 W. K. Leher, et al, Colorado County wildcat, for a small pumping oil discovery. Through perforations at 6,180-90 ft., the well pumped 23 bbl. of 36.4°-gravity oil daily. Hole was drilled to total depth of 9,946 ft., and operator set 5½-in. casing to 6,386 ft. This new pool opener is located in Naham Mixon Survey, Abstract 402, approximately 9 miles southwest of Garwood.

Three miles east-northeast of South Cottonwood Creek field, DeWitt County, A. J. Gray is running production tests at 1 C. A. H. Sager, wildcat. Operator has squeezed off perforations at 7,698-7,700 ft. subsequent to cementing 5½-in. casing to 7,783 ft. On drill-stem test in the Massive sand at 7,696 ft., recovery was 64 ft. of condensate. The well developed a high working pressure at the surface.

Magnolia Petroleum has stopped drilling 1 J. T. Browning, deep outpost on the southwest flank of Lolita field, Jackson County, after failing to find a deeper sand. The well was drilled to 9,012 ft., and operator set pipe at 8,815 ft. Drill-stem test at 8,230-34 ft. recovered water cushion and salt water with no show of oil. Another test at 5,298-5,300 ft. and 5,223-28 ft. also showed salt water.

General Crude Oil Co. is preparing to move into location to drill 1 William Rooney, proposed 11,000-ft. wildcat in Chambers 1⅜ miles southeast of Winnie-Stowell field. Drill site is in James Hogatt Survey, Abstract 14. It is reported without confirmation that location is on a seismic high. The well will test deep Frio horizons between 8,755-9,890 ft. and Hackberry from 10,150-10,875 ft., both of which are productive at Winnie-Stowell.

Gottschalt field, Goliad County, has possibilities of ½-mile northeast extension at Callary & Hurt, Inc., 1 C. C. Ludicke Estate. The venture is bottomed at 7,925 ft., and operator is running 5½-in. pipe for production tests. A gas sand was topped at 7,373 ft. which corresponds with the gas pay in Gottschalt field. The field also produces oil around 7,700 ft. Details of any shows in the formation immediately above total depth have not been reported.

TEXAS GULF COAST (DISTRICTS 2 AND 3) WILDCAT FAILURES

Calhoun County: Quintana Petroleum Corp. B-1 R. H. Hamilton, P. Guajardo Sur., dry, TD 8,500 ft.

Fayette County: H. E. Burkhart, et al, 1 Mary A. Brown, et al, David Berry Sur., A-15, dry, TD 5,212 ft.

O. Nether, Jr., 1 Mary A. Johnson, Adam Zumwalt Sur., A-118, dry, TD 2,035 ft.

Goliad County: John S. Neilson & American Republics Corp. 1 Gladys Powell, Pedro Trevino Sur., A-45, dry, TD 7,729 ft.

Ryan, Hays & Burke 1 C. C. Diebel, Sampson McTonarl Sur., A-195, dry, TD 4,879 ft.

Grimes County: J. M. West 1 Olla Heath Garrett, A. B. Dodson Sur., A-174, dry, TD 1,550 ft.

Hardin County: L. D. Cain 1 Jennie B. Settegast, et al, H. Warnell Sur., A-539, dry, TD 7,917 ft.

Harris County: The Texas Co. 1 Faetcher

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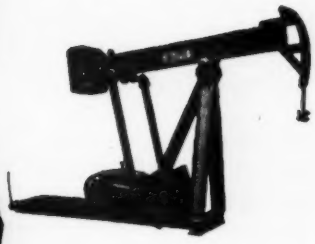

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Klein Unit, Daniel Harmon Sur., A-315, dry, TD 7,515 ft.

Matagorda County: J. Keet Lewis & W. P. Taylor Drilling Co. 1 Denman Kountze & J. T. Stewart, I&GN RR Sec. 200, Block 8, A-322, dry, TD 8,355 ft.

Montgomery County: Moran Corp. 2-B Hutchins-Sealy National Bank, J. C. Pitts Sur., A-28, dry, TD 5,605 ft.

Victoria County: Hankamer Investment Co. 1 J. H. Shiller Estate, M. A. Castonon Sur., A-146, dry, TD 6,738 ft.

H. L. Hunt 1 Dan Fagan, Juan Gonzales Sur., A-52, dry, TD 7,015 ft.

Illinois-Ind.-Ky.

Henderson County Tests Reveal Three New Pools

THREE additional new pools appear to have been uncovered in Henderson County, western Kentucky, scene of one of the districts most active wildcatting plays.

Six miles northeast of Henderson and 3 miles northwest of the Zion pool, Joe Reznik and associates have a prospective good well at their 1 Farley, C SE 15-Q-25. This well got a strong gas blow with a spray of oil and recovered 360 ft. of clean oil in a drill-stem test of saturation found in O'Hara lime at 2,319-24 ft. Tester was open 105 minutes with gas showing at the surface in 30 minutes and oil spray in 60 minutes. Casing has been run for completion.

Three and a half miles southwest of Henderson and about 2 miles from other production, George S. Engle found good saturation in McClosky lime at his 1 T. W. Posey estate, in 14-P-23. A 2-hour drill-stem test at 2,594-99 ft. in this pay flowed gas in 25 minutes and filled 120 ft. of clean oil with an additional 120 ft. of oil-cut mud. Total depth is 2,600 ft. with 5½-in. casing at 2,594 ft.

In the next section to the south, in 17-P-23, the same operator found oil saturation in Waltersburg sand at 1,683-1,710 ft. in his 1 Alex Posey. Two drill-stem tests were made. The first at 1,683-1,705 ft., open 2 hours, recovered 20 ft. of clean oil and 30 ft. of oil-cut mud. The other, made of the same zone with hole deepened to 1,710 ft., filled 180 ft. of clean oil and 70 ft. of oil-cut mud. Bottom-hole pressure was 615 psi. It has casing run to the top of the sand.

Ralph Halbert and associates 1 Auten heirs, NW NW SW 32-6s-5e, southern Hamilton County, Illinois, produced at an average rate of 14 bbl. of oil per hour in swabbing tests and is being put on the pump for completion to open a new pool 2 miles west of Rural Hill. Pay zone is Aux Vases sand at 3,236-47 ft. Location is a mile north of the Cantrell pool and southwest of production in the Rural Hill area.

Production of the Parkersburg Consolidated pool in the area 3½ miles southeast of Calhoun, in Richland County, Illinois, is being extended ½ mile to the northeast where R. Hal Compton and associates are starting production tests at their 1 Ivey, SW NE NW 15-2n-14w. Pay zone is McClosky lime at 3,072-79 ft., where a drill-stem test got gas in 3 minutes and flowed clean oil in 55 minutes with a bottom-hole pressure of 540 psi.

ILLINOIS SUCCESSFUL WILDCATS

Wabash County: Indiana Farm Bureau 1 Zimmerman, N½ NE NW SW 10-1s-12w, IP 42 bbl., Cypress 1,970-78 ft., TD 1,993 ft.

Washington County: James N. Hockman 1 Riechman, NW SE NW 25-1s-1w, IP 45 bbl. Cypress 1,531-40 ft., TD 1,541 ft.

ILLINOIS WILDCAT FAILURES

Bond County: Hoiles Petroleum Co. 1 Pavlige, NE NW NE 4-4n-3w, dry, TD 1,245 ft.

T. M. Conrey 1 Wegman, SE NW NE 32-4n-3w, dry, TD 1,260 ft.

Clay County: D. H. Bolin 1 Bogan, SE SE SW 21-3n-6e, dry, TD 3,070 ft.

J. F. Balderson 1 Lewis, SE SE SE 31-5n-8e, dry, TD 3,137 ft.

Clinton County: H. F. Robison et al 1 Prather, SW NW SE 34-2n-2w, dry, TD 1,442 ft.

Fayette County: Pure Oil Co. and Simpson Drilling Co. 1 Wade, NE NW NE 4-4n-1w, dry, TD 2,952 ft.

Franklin County: George & Wrather Drilling Co. 1 Marshall-Clark, SW SE SW 2-5s-3e, dry, TD 3,143 ft.

Hamilton County: A. Sturm & Sons 1 Redfearn, NE NE NW 21-5s-6e, dry, TD 3,340 ft.

Noah Petroleum Co. 1 Stelle, SW NE SW 32-5s-6e, dry, TD 3,400 ft.

Jefferson County: Wimmar Oil Co. 1 Tinsley, SE SE SE 30-1s-2e, dry, TD 2,320 ft.

Lawrence County: Olds Oil Co. 1 Green, NW NW NW 16-2n-13w, dry, TD 2,558 ft.

Hughes-Murphy Drilling Co. 1 Heath, SW SW NW 36-4n-13w, dry, TD 2,132 ft.

Perry County: W. L. McNeill 1 Rusiewski, NW SE SE 16-4s-1w, dry, TD 1,225 ft.

Richland County: Calvert Drilling, Inc., 1 Wells, SW NW SW 11-2n-9e, dry, TD 3,204 ft.

Wayne County: Collins Brothers Oil Co. 1 Hart, SW NW NE 16-1s-9e, dry, TD 3,465 ft.

Peak Drilling Co. and Ralph Halbert 1 Laughlin-Anderson, SE SE SE 20-2n-6e, dry, TD 3,201 ft.

White County: George Schoonmaker 1 Hill, SE SE SE 34-5s-10e, dry, TD 3,178 ft.

INDIANA SUCCESSFUL WILDCATS

Knox County: C. W. Dittman 1-Jobe-Held, Military Donation 229-2n-8w, IP 10 bbl. Aux Vases, TD 1,560 ft.

Monroe County: George Pappas et al 1

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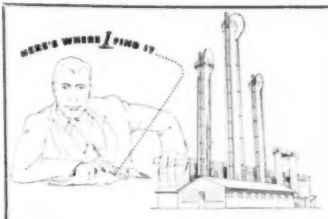

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Smith, SE SE SW 21-7n-1e, IP 8 bbl., Trenton 1,766-80 ft., TD 1,795 ft.

INDIANA WILDCAT FAILURES

Clay County: Gulf Refining Co. 1 Sinders, NW NE NW 5-9n-6w, dry, TD 1,786 ft.

Daviess County: Zogg & Neely 1 Freyberger, SW SW SE 2-1n-5w, dry, TD 1,016 ft.

Gibson County: Ashland Oil & Refining Co. et al 1 Montgomery, NE NW SE 36-3s-12w, dry, TD 1,721 ft.

Knox County: F. D. Walker 1 Stewart, NE SE NW 4-1n-9w, dry, TD 1,702 ft.

H. Paul Maier 1 Small, Military Donation 60-2n-8w, dry, TD 1,567 ft.

Cline-Lambert 1 Dellinger, Military Donation 178-2n-9w, dry, TD 1,656 ft.

(Continued on page 163)

Rocky Mountain

Williston Basin Wildcats Now at Critical Depths

DENVER.—Additional shows are reported from the Williston basin for the important Shell Oil Co. Richey, Montana, wildcat and the operator reports the well coring below 7,956 ft., 700 ft. below the zone where oil was found recently. The wildcat is 1 Northern Pacific, SE NW NW 19-23n-50e, Dawson County, on the west side of the basin.

Shell has lost circulation difficulties at 7,607 ft. in the Pine Unit wildcat, SW SW NE 30-12n-57e, Wibaux County, 75 miles southeast of the Richey wildcat.

Charles (Upper Mississippian) was reported in The Texas Co. Baker Glendive wildcat, C NE NE 35-15n-54e, between the two Shell wildcats, at 6,945 ft., and the well is now drilling below 7,243 ft.

It is reported in Bismarck that H. L. Hunt is now planning three wildcats along the east-central portion of the basin, through central North Dakota. Several major operators will reportedly contribute to the program, which is planned to start immediately with all three wells going simultaneously. Such an exploratory drilling program would be of importance in an area of the basin where there has been no previous drilling. No announcement has been made of probable locations for the wells but they will probably be through the general area of Bottineau, McHenry, and Sheridan counties, where Hunt has sizable holdings. This area is west of an exploratory drilling program now under way by Union Oil Co. of California, Hancock Oil Co., and Signal Oil Co. through Devils Lake area. These operators have completed three dry holes and are now drilling on the fifth well. Also east of the planned program is a wildcat being drilled by Ajax Oil Co. of Casper in the C NE NE 28-158n-72w, Pierce County. This well is now at 5,383 ft. with drill pipe stuck.

A possible new producing zone for the Denver-Julesburg basin may be established by W. E. Atkinson, Fergus Falls, Minn., and C. S. Lavington of Denver in their deep test at Loveland, Larimer County. The well is 1 B.I.Q. Unit, SE SW NE 31-5n-68w, on the west side of the basin. The well was drilled to 5,482 ft., total depth, in Dakota, and plugged back for drill-stem test of the Timpas-Frontier zone at 4,795-4,827 ft. The well made 240 ft. of oil and gas-cut drilling mud and the operators are now running casing to the top of the zone. Production through this basin, including older fields along the west side, is from the Dakota zone, with some production, as at Loveland, from shallow wells in the Hygiene.

Another discovery for the Sussex-Meadow Creek area has been completed by Continental Oil Co. The company's 1 Unit, NW SE NW 8-42n-79w, at West Sussex, has been completed for a flowing potential of 450 bbl. of oil daily from the Shannon after failing to find production in lower zones. Shannon is between 2,850-2,950 ft. in the well. This is the seventh pool in the general Sussex-Meadow Creek area, and is 6 miles west of the closest producer in the Sussex Unit proper.

Southern Union Gas Co. 2 Culpepper-Martin, a Dakota test in Largo area, San Juan County, New Mexico, is at 6,798 ft. in the Dakota. Despite rumors, Southern Union reports that no saturation whatsoever was encountered near the top of the Dakota, though there were substantial gas showings at 6,440 ft. Fractured nature of the sandstone prevented successful drill-stem tests.

WYOMING WILDCAT FAILURES

West Bonanza, Big Horn County: Stanolind Oil & Gas Co. 1 Government-Gallivan, NW NE NW 21-49n-91w, dry, TD 4,665 ft. Madison 4,412 ft.

South Bonanza, Washakie County: Rock Creek Oil Co. 1 Government, SW NW NE 1-48n-91w, dry, TD 2,594 ft. Tensleep 2,542 ft.

Morton Dome, Washakie County: Ameera Oil Co. et al. 1 Government, NE SE NW 6-44n-88w, dry, TD 6,178 ft. Tensleep 6,020 ft.

COLORADO WILDCAT FAILURE

Cooper area, Morgan County: Shell Oil Co. 1 K. M. Funk, SW SW NW 19-6n-55w, dry, TD 5,966 ft. Morrison 5,916 ft.

MONTANA WILDCAT FAILURES

McTwiggan area, Garfield County: Amerada Petroleum Corp. 1-B N.P.R.R., NW NW 1-14n-32e, dry, TD 6,588 ft. Charles 5,897 ft., Mission Canyon 6,497 ft.

Agawan, Teton County: General Petroleum Corp. 71-5-P, NW NE NE 5-26n-4w, dry, TD 2,185 ft. Madison 2,155 ft.

WESTERN NEBRASKA SUCCESSFUL WILDCAT

Kimball, Kimball County: Nebraska Drillers 1 Torgeson, SE NW NW 23-14n-56w, TD 6,523 ft. Pumped 150 bbl. of oil daily. "J" sand 6,506 ft.

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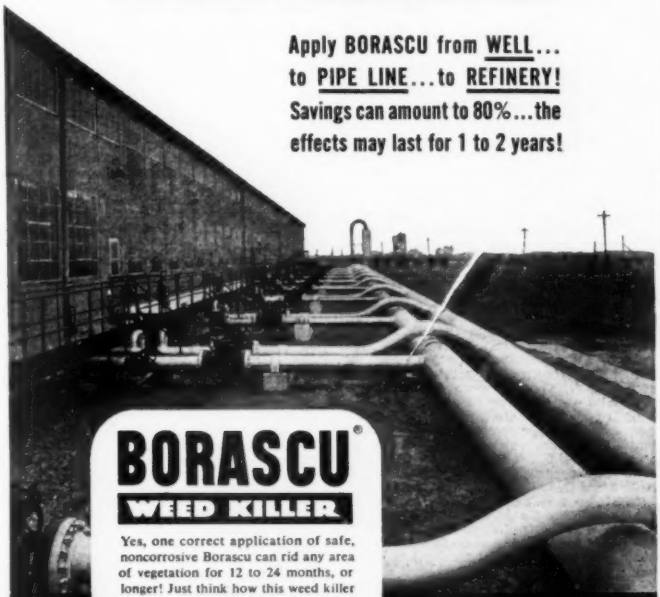

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Canadian Fields

Black Oil Discovery Made in Saskatchewan

REGINA.—About 30 miles southeast of Hearts Hill, (A on map) an indicated black-oil discovery made last year, Royalite Oil Co., Ltd., and Albercan Oil Corp., has indicated another black-oil discovery at 1 Smiley (B on map).

Oil was found during two drill-stem tests of basal Cretaceous sands topped at 2,685 ft. The first test, at 2,681-88 ft., gave a strong blow throughout with a recovery of 30 ft. of oil-cut frothy mud and 180 ft. of clean black oil in 1 hour. The second test, also for 1 hour, was made at 2,682-93

ft. and recovery was 30 ft. of oil-cut frothy mud and 215 ft. of clean oil, no water. Gravity of the crude is estimated at 14°. Location of the test is LSD 4, 30-31-23w3. This is the same well which recently tested the Viking sand at 2,275-95 ft. and had a gas flow estimated at 8-10 million cubic feet daily.

About 27 miles southeast of the Royalite-Albercan wildcat, Husky Oil & Refining Co., Ltd., and Phillips Petroleum Co. struck a flow of natural gas in the Viking sand at 2,357-80 ft. at their 1 Brock (C on map) in LSD 13, 29-28-20w3. A 12-minute test indicated a flow of 5-8 million cubic feet of gas daily. There was no fluid recovery. This wildcat is drilling ahead.

At D on map is Socony-Vacuum Exploration Co. and Western Prairie Exploration Co. 1 Tompkins which recently tested gas at the rate of 2 million cubic feet daily at a depth of 3,650 ft. in the Jurassic-Hulett sand. This wildcat is projected to 6,500 ft. Spot is LSD 14, 19-13-20w3.

Alberta.—The Texas Co. B-2 Wizard Lake, LSD 3, 5-22-48w4, has opened up 293 ft. of water-free oil-bearing Devonian reef (D3) and has yet to find the bottom of the pay. This well is ¼ mile south of The Texas Co.'s Wizard discovery which found oil in basal Cretaceous sands and in the Devonian-D2 reef and was completed as a large oil well after penetrating only 11 ft. of Devonian D3.

The pay section already indicated in B-2 Wizard Lake is the thickest yet found in Alberta outside of Golden Spike field, where D3 pay ranges up to 600 ft. in thickness. With the interval 5,994-6,287 ft. open to production, B-2 Wizard is flowing 39° gravity oil at high rates. Wizard field is 5 miles southwest of the Leduc oil area and the reef is 500 ft. lower in the older fields.

Texas B-3 Wizard has been placed on production. Located ¼ mile east of the discovery well, the new producer is showing a flow rate of 2,064 bbl. daily. This well was dug 95 ft. into the D3 where it stopped without finding water.

CANADIAN WILDCAT FAILURES

British Dominion-Osage 1, LSD 4, 14-8-7w4, TD 3,729 ft.

Shell-Cadotte River 1, LSD 16, 23-85-19w5, TD 6,106 ft.

Angus 1, LSD 16, 7-53-10w5, TD 6,510 ft.

McDougall-Segur-Texaco 1, LSD 8, 15-54-18w4, TD 4,001 ft.

D.L.P.-Red Deer 1, LSD 14, 22-5-25w4, TD 3,380 ft.

Hudson's Bay-Sparky 4, LSD 4, 22-28-5w4, TD 3,004 ft.

Texaco-Superior-Ranfurly 4, LSD 11, 29-50-12w4, TD 2,109 ft.

Smith-C.P.R. 2, LSD 7, 8-20-15w4, TD 4,601 ft.

EASTERN CANADA

ONTARIO.—In Elgin County, development work carried out by A. G. Bailey & Co. of Calgary between West Lorne and Rodney has resulted in two completions. Early in August a well drilled on the George Cipu farm blew in at 376 ft. with gas flow of 385,000 cu. ft. a day. A second test on the nearby Russell Humphrey farm finished at 486 ft. with initial-oil production of 20 to 25 bbl. Clarence Story, Calgary, who has been supervising leasing and development, is planning to bring in a rotary outfit to speed up the testing of the field.

Louisiana-Arkansas

Cotton Valley Opened In East El Dorado Field

SHREVEPORT.—Pan Am Southern Corp. has officially completed its 1 Ezzell, 13-17s-15w, Union County, Arkansas, flowing at the rate of 75 bbl. of 40°-gravity oil daily through a 10 64-in. tubing choke. This new discovery is located on the northeastern edge of East El Dorado field. Production is from perforations in the Cotton Valley at 5,026-28 ft.

At its B-1 Southern Co., McAlester Fuel Co. is rigging up pump and erecting tanks preparatory to making an official production test. This wildcat, located 1½ miles northeast of Bear Creek field in Union County, near the Union-Ouachita line, was drilled to 4,010 ft. A drill-stem test at 3,778-85 ft. yielded 425 ft. of oil and 30 ft. of oil-cut mud and salt water. Casing, set at 3,834 ft., was reperforated at 3,780-89 ft. after squeeze cementing other perforations, and some oil was swabbed to pits. Spot is 50 ft. east of C NW NW SW 4-16s-17w.

Louisiana.—C. M. Bagley Co. 1 Logan, NE SW SW 9-16n-7e, about ½ mile southwest of Dehlco discovery well and 1 mile northwest of production in Big Creek field, Richland Parish, logged a total of 17 ft. of Tuscaloosa oil sand at 2,595-2,606, 2,633-35 and 2,695-99 ft. On a 19-minute drill-stem test at 2,593-2,606 ft. the well showed gas in 11 minutes and pipe unloaded 350 ft. of pipeline oil, no water. With the bottom of the hole at 3,040 ft., casing was cemented at 2,750 ft. From perforations at 2,595-2,606 ft. the well tested oil and water. A squeeze job is underway.

NORTH LOUISIANA WILDCAT FAILURES

Bienville Parish: Sohio Petroleum Co. 1 E. W. Merritt, 571 ft. S and 534 ft. W NEc 24-17n-7w, dry, TD 7,813 ft. Elev. 311 ft. Cretaceous 2,013 ft., Tokio 2,812 ft., Tuscaloosa 3,653 ft., Lower Cretaceous 3,900 ft., James 6,133 ft., Sligo 6,643 ft., Travis Peak 7,000 ft.

Catahoula Parish: Hunt Oil Co. and Gulf Oil Co. 65 Louisiana Delta Hardwood Lumber Co., Inc., et al, SW NW 5-5n-5e, dry, TD 6,000 ft. Elev. 50 ft. (est.) Wilcox 3,485 ft.

G. W. Gulmon et al 1 W. T. Smith, SE SW 39-7n-6e, dry, TD 6,504 ft. Elev. 61 ft. Wilcox 3,520 ft., base Big shale 4,587 ft.

Concordia Parish: Justiss Mears Oil Co., Inc., et al 1 Wilson, NW SE 17-6n-7e, dry, TD 6,520 ft. Elev. 52 ft. Wilcox 3,926 ft., base Big shale 5,158 ft.

Franklin Parish: A. C. Duerr et al 1 B. C. Kimble, NW SE 35-12n-8e, dry, TD 8,110 ft. Elev. 68 ft. Wilcox 2,763 ft., Midway 5,237 ft., Eagleford 6,880 ft., Tuscaloosa 7,155 ft., Lower Cretaceous 7,930 ft.

Lincoln Parish: Southwest Gas Producing Co. 1 Jim Peterson, 1,000 ft. S and 1,000 ft. W NEc 25-20n-4w, dry, TD 12,234 ft. Elev. 30 ft. Hooston 5,202 ft., Cotton Valley 7,702 ft., Bodcaw 8,290 ft., Vaughn 8,406 ft., Davis 8,700 ft., Jones 11,172 ft., top salt 12,230 ft.

Nachitoches Parish: Magnolia Petroleum Co. 1-B Union Saw Mill, SE SW 11-5n-7w, dry, TD 6,570 ft. Elev. 229 ft. Wilcox 3,610 ft., Midway 6,52 4ft.

Sabine Parish: Mapor Oil Co. 3-A Louisiana Long Leaf Lumber Co., NE SW NE 24-8n-14w, dry, TD 2,347 ft.

Winn Parish: Nebo Oil Co. 1 fee, 700 ft. S and 2,080 ft. E NWc 25-9n-3w, dry, TD 4,453 ft.

Natural Gas & Oil Corp. 5 Urania Lumber Co., 2,460 ft. S and 1,718 ft. E NWc 27-11n-1e, dry, TD 3,504 ft.

Webster Parish: Hunt Oil Co. 1 J. S. Lewis, 1,220 ft., sand 1,223 ft., W NEc 15-23n-9w, dry, TD 11,500 ft.

ARKANSAS WILDCAT FAILURES

Union County: Shell Oil Co. 3 U.S.M., SW NW NE 8-17s-12w, dry, TD 2,910 ft. (Core test).

Ranney Exploration Co. 1 Urbana Lumber Co., NE NW NE 16-19s-13w, dry, TD 3,704 ft.

Appalachian-Ohio

Deep Wildcat Test Finds Additional Flow of Gas

PITTSBURGH.—In Napier Township, Bedford County, Southwest Pennsylvania, South Penn Oil Co., Snee & Eberly, et al, 1 Jesse B. Miller, a deep wildcat test, has cleared up its fishing job. At a depth of 8,890 ft., the wildcat is shut down after encountering gas testing approximately 500,000 cu. ft. daily. The Trenton was logged at 7,810 ft., and the Beekmantown lime at 8,837 ft. from an elevation of 1,666 ft.

In South Buffalo Township, Armstrong County, Pittsburgh Plate Glass Co. 2-839 Mary A. McGinley, a deep test, is drilling at 4,054 ft.

Maryland.—In Garrett County three new locations have been made. Eberly & Snee 2 Gordon and 2 Eli Beechie, are moving in tools. Cumberland and Allegheny Gas Co. 1 C. C. Mason is a location.

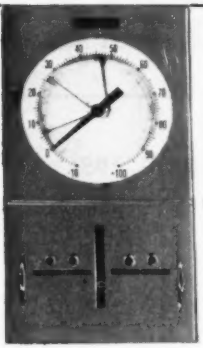
Columbian Carbon Co. 1-GW-1,506 Emily F. Moon, elevation 2,455 ft., is drilling at 4,043 ft. in chert. The Onondaga was reached at 4,014 ft.

Matthews & Gooseman 1 M. L. Calhoun has resumed drilling at 3,796 ft., where a fishing job developed. Borden 1 Will Robeson, elevation 2,520 ft., is drilling in the Onondaga, topped at about 4,850 ft.

West Virginia.—In the Poca district of Putnam County, South Penn Oil Co. 5 Frank A. Hardy et al, elevation 829 ft., gaged 5,529,000 cu. ft. of gas after shot. Pressure was 1,250 psi. in 16 hours. The Coniferous lime was topped at 4,810 ft. The Oriskany sand was found at 4,910-18 ft. with gas at 4,911-17 ft. Depth of the well is 4,929 ft.

OHIO

COLUMBUS.—Wiser Oil Co. 1 M. W. Glaugue, Section 5, Tiverton Township, Coshocton County, a 1-mile step-out, found Clinton sand at 3,184-3,205 ft. with a show of oil and 270,000 cu. ft. gas. The sand was shot with 30 qt. and the well gaged 475,000 cu. ft. of gas in 3 hours and made 12 bbl. of oil in 24 hours.



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Write for Bulletin No. 11-86

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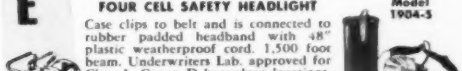

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FREE CATALOG Write Dept. OGJ

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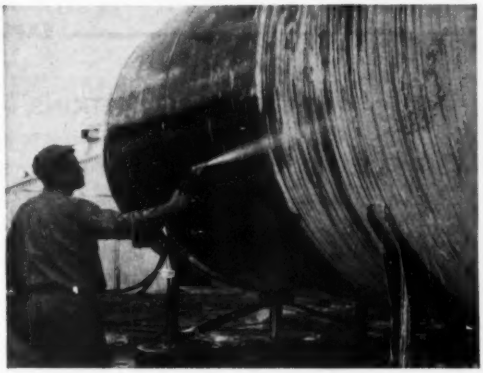
How to strip a storage tank



without scraping or sandblasting

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PETROLEUM SERVICE DIVISION

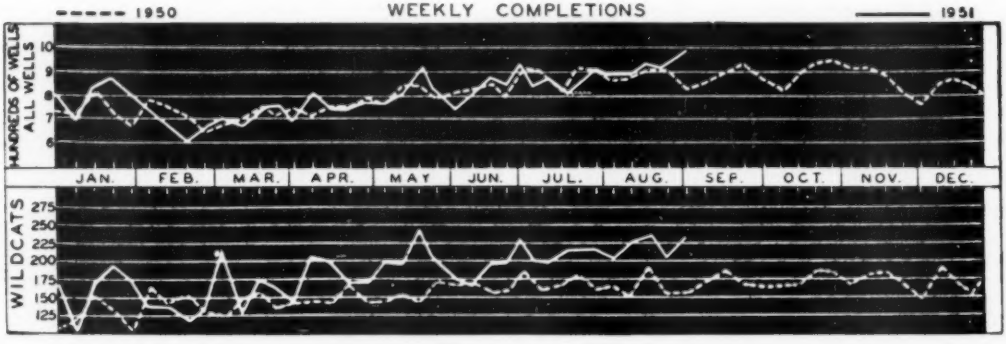
CURRENT STATISTICS

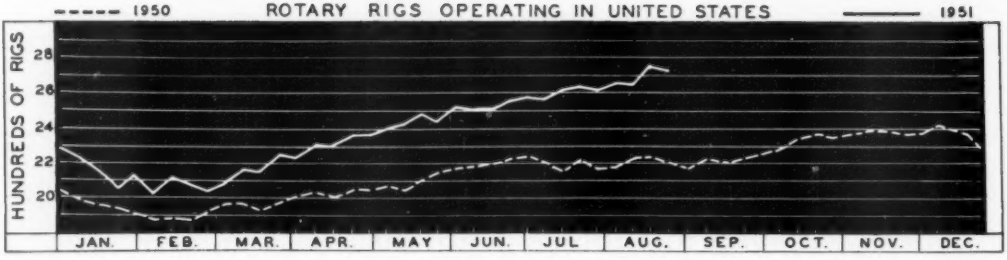
EXPLORATION

WEEKLY WELL COMPLETIONS . . . WEEK ENDED SEPTEMBER 1, 1951

	Total of all wells					Sept. 1		Wildcat completions and discoveries					Cumulative total, 1951				
	Comp.	Oil	Gas	Dry	Footage	1951	1950	Oil	Dist.	Gas	Dry	Total	Oil	Dist.	Gas	Dry	Total
New York	17	8	0	*9	23,800	418	458	0	0	0	0	0	0	0	0	0	0
Pennsylvania	37	21	5	†11	72,200	931	911	0	0	0	0	0	0	0	0	1	1
West Virginia	11	1	7	3	30,343	375	450	0	0	0	0	0	0	0	9	6	15
Ohio	23	8	9	6	54,565	623	662	0	0	0	0	0	1	0	5	16	22
Indiana	39	11	1	27	76,460	821	1,046	2	0	0	13	15	30	0	1	224	255
Kentucky	30	12	4	14	28,699	789	721	1	0	0	5	6	16	0	1	109	126
Illinois	59	25	0	34	150,748	1,576	1,813	2	0	0	17	19	47	0	0	354	401
Michigan	16	3	2	†11	31,783	513	578	0	0	1	5	6	15	0	7	196	218
Kansas	111	58	8	45	331,301	2,928	2,540	5	0	0	19	24	147	1	11	589	748
Nebraska	8	4	0	4	24,445	154	60	1	0	0	3	4	6	0	1	75	82
Oklahoma	115	59	10	§46	409,343	3,727	3,613	4	0	0	13	17	128	2	16	480	626
Texas	356	211	24	121	1,639,829	11,143	10,914	18	1	2	71	92	493	38	82	2,272	2,885
North Central (Dist. 7-B & 9)	98	58	0	40	307,661	3,392	3,320	8	0	0	23	31	240	2	11	972	1,225
West (Dist. 7-C & 8)	108	86	2	20	582,696	3,353	3,268	8	0	1	11	20	117	9	6	426	558
Panhandle (Dist. 10)	18	4	14	0	55,880	471	622	0	0	0	0	0	2	0	0	15	17
Eastern (Dist. 5 & 6)	25	13	1	11	115,487	813	790	0	1	0	8	9	8	6	0	162	176
Gulf Coast (Dist. 2 & 3)	44	21	2	21	268,665	1,555	1,517	0	0	0	12	12	63	14	42	322	441
Southwest (Dist. 1 & 4)	63	29	5	29	309,840	1,559	1,397	2	0	1	17	20	63	7	23	375	468
Louisiana	58	30	1	27	367,198	1,394	1,639	0	1	0	14	15	29	6	5	187	227
Northern	38	16	0	22	172,930	749	878	0	0	0	11	11	7	0	3	109	119
Southern	20	14	1	5	194,268	645	761	0	1	0	3	4	22	6	2	78	108
Arkansas	10	5	1	4	31,829	267	273	0	0	0	2	2	10	0	3	57	70
Mississippi	12	1	0	11	67,234	231	216	0	0	0	11	11	10	3	0	90	103
Southeastern States	0	0	0	0	0	35	44	0	0	0	0	0	0	0	0	14	14
Montana	2	0	0	2	8,773	139	149	0	0	0	2	2	0	0	0	32	32
Wyoming	17	12	0	5	85,619	490	385	0	0	0	3	3	7	0	1	67	75
Colorado-Utah	6	4	0	2	27,218	175	49	0	0	0	1	1	6	0	4	88	98
New Mexico	14	5	6	3	69,500	426	415	0	0	0	1	1	11	0	7	49	67
California	51	35	0	16	225,859	1,498	1,185	0	0	0	13	13	31	0	2	301	334
Miscellaneous	1	0	0	1	6,525	53	36	0	0	0	1	1	1	0	19	17	37
Total United States	993	513	78	402	3,813,271	28,706	28,157	33	2	3	194	232	988	50	174	5,224	6,436
Total previous week	911	467	66	378	3,586,798			30	0	4	171	205	955	48	171	5,030	6,204
Total September 2, 1950	832	451	48	333	2,984,673			27	2	3	123	155	739	51	124	4,178	5,092

Service wells included: *9, †8, ‡1, §3.





DAILY AVERAGE PRODUCTION FOR WEEK

	Sept. 1 crude oil	B. of M. Aug. demand	Aug. 25 crude oil
Alabama	2,900	2,400	3,000
Arkansas	76,150	85,000	75,900
California	977,600	980,000	976,200
Colorado	77,700	80,000	77,500
Eastern	59,750	64,000	60,950
Florida	1,525	1,600	1,475
Illinois	168,100	165,000	164,100
Indiana	32,400	29,000	31,700
Kansas	322,050	320,000	324,200
Kentucky	31,700	29,000	31,400
Louisiana	612,300	671,000	610,175
North Louisiana	113,700		113,950
South Louisiana	498,600		496,225
Michigan	38,600	42,000	40,100
Mississippi	99,700	104,000	102,650
Montana	24,600	24,000	24,400
Nebraska	6,050	10,000	6,200
New Mexico	145,575	154,000	147,300
Oklahoma	506,500	530,000	506,200
Texas	2,780,475	2,690,000	2,772,625
Dist. 1 (Southwest)	33,575		33,575
Dist. 4 (Southwest)	257,975		257,725
Dist. 2 (Gulf Coast)	161,925		161,175
Dist. 3 (Gulf Coast)	476,025		474,250
Dist. 5 (Eastern)	55,900		55,700
Dist. 6 (Eastern)	115,925		115,600
East Texas	272,150		271,300
Dist. 7-C (West)	104,950		104,400
Dist. 8 (West)	974,175		971,050
Dist. 7-B (W. Central)	82,150		81,900
Dist. 9 (N. Central)	159,900		159,950
Dist. 10 (Panhandle)	85,825		86,000
Utah	3,900	5,000	4,000
Wyoming	190,100	178,000	191,200
Total United States	*6,157,675	6,164,000	6,151,275
Change from previous week, up 6,400			
Canada	174,300		183,400

Total U. S. production January 1-September 1 ††1,480,707,165 bbl.
Same period last year (crude plus cond.) 1,270,569,005 bbl.

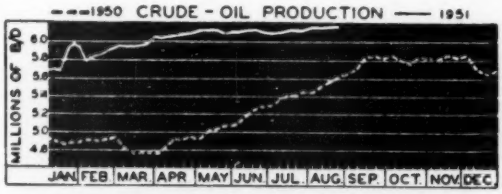
*Not including 103,550 bbl. condensate. †Including 25,669,175 bbl. condensate. ‡Revised.

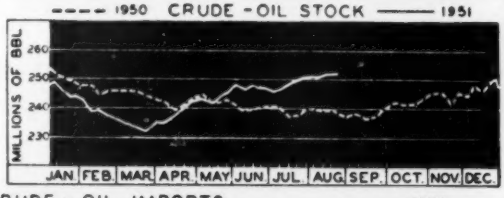
CRUDE-OIL STOCKS BY STATES OF ORIGIN*

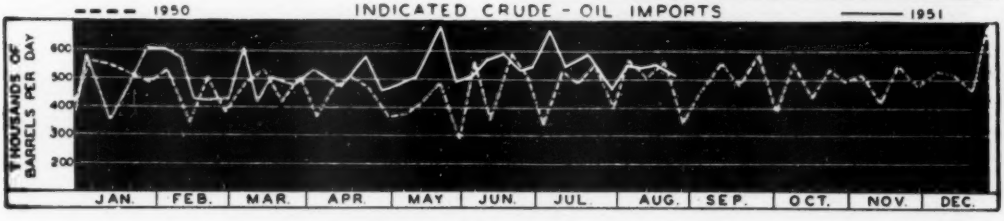
(Thousands of barrels)

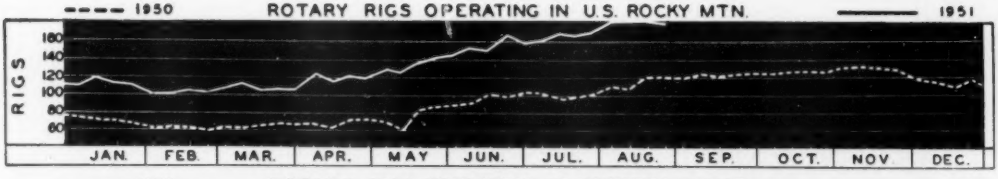
	Aug. 25, 1951	Aug. 18, 1951	Aug. 26, 1950
Pennsylvania Grade	2,111	2,118	2,604
Other Appalachian	1,663	1,497	1,293
Illinois, Indiana, Michigan	11,049	10,967	9,200
Arkansas	2,650	2,640	2,753
Louisiana	14,283	14,349	14,887
North	2,748	3,061	3,092
Gulf	11,535	11,288	11,795
Mississippi	3,151	3,024	2,317
New Mexico	6,461	6,553	6,111
Oklahoma and Kansas	38,563	38,693	33,650
Texas	120,262	120,436	114,053
East Texas	14,907	14,895	14,685
West Texas	50,804	50,553	42,962
Texas Gulf	26,701	26,757	28,040
Other Texas	27,850	28,231	28,366
Rocky Mountain	13,353	13,529	11,317
California	30,445	30,378	32,455
Foreign	8,266	7,974	6,294
Total	252,257	252,158	236,934

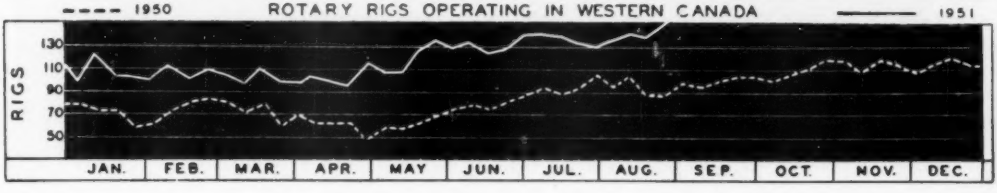
*Bureau of Mines.









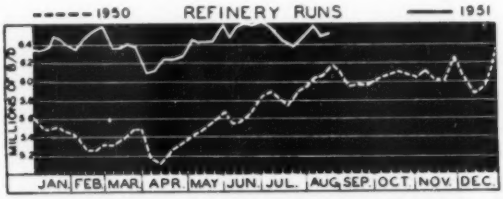


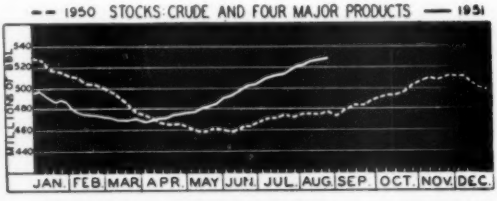
A.P.I. REFINERY REPORT, AUGUST 25

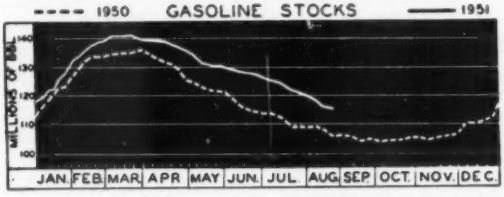
(Thousands of barrels)

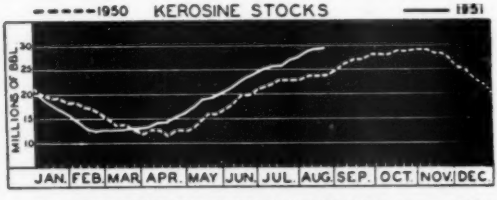
District—	Daily avg. crude runs	Daily average production				Stocks at refineries, bulk terminals, in transit and in pipe lines				Bureau of Mines, August 1950				
		Gasoline*	Kerosine	Distillate	Residual	Gasoline†	Kerosine	Distillate	Residual	Daily avg. crude runs	Daily average production			
											Gasoline*	Kerosine	Distillate	Residual
East Coast	1,017	401.3	56.0	233.2	221.4	25,213	10,897	27,029	12,061	976	410.4	34.3	207.8	210.2
Appalachian:														
District 1	107	42.1	4.4	18.3	10.9	2,805	644	1,074	592	100	42.3	5.0	13.4	9.4
District 2	70	34.6	2.4	10.0	11.6	1,398	338	358	322	69	33.8	4.0	7.3	13.5
Ind., Ill., Ky.	1,197	620.1	57.3	210.3	147.7	25,175	6,527	19,077	5,605	1,070	583.3	64.0	166.9	137.0
Okla., Kans., Mo.	502	259.0	16.4	116.4	54.0	12,037	1,790	9,923	1,795	531	288.9	13.8	118.9	61.7
Inland Texas	260	171.1	14.1	39.1	37.6	3,895	556	1,596	1,072	225	140.3	10.5	32.0	40.0
Texas Gulf Coast	1,558	755.0	118.2	299.9	269.3	18,108	4,639	10,443	6,370	1,385	653.8	104.3	281.4	231.5
La. Gulf Coast	513	239.0	34.0	116.6	59.9	6,121	2,636	4,207	2,012	489	234.2	59.1	99.5	61.5
N. La. and Ark.	86	36.3	7.3	18.1	7.4	2,296	486	1,105	154	71	27.3	6.1	14.2	11.6
Rocky Mountain:														
New Mexico	14	7.3		2.9	3.9	129		68	37	15	8.1	.3	2.7	3.5
Other Rocky Mtn.	236	107.6	5.0	46.7	43.4	4,216	402	2,092	1,159	206	89.3	4.7	39.1	37.1
California	940	411.2	6.9	140.1	384.8	14,541	589	8,571	15,574	930	419.8	10.9	106.0	330.9
August 25, 1951	6,500	3,084.6	322.0	1,251.6	1,251.9	115,934	29,504	85,543	46,753	6,067	2,931.5	317.0	1,089.2	1,147.9
August 18, 1951	6,470	3,075.1	356.7	1,227.6	1,206.0	116,668	28,923	83,113	47,166					
August 26, 1950	6,197	2,894.7	324.6	1,079.9	1,220.4	105,793	24,829	65,841	41,697					

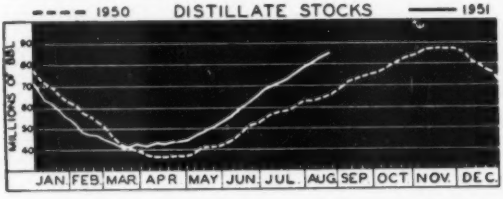
*At refineries including natural blended. †Finished and unfinished.

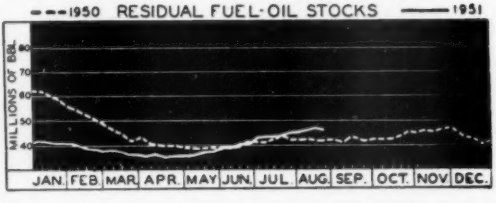


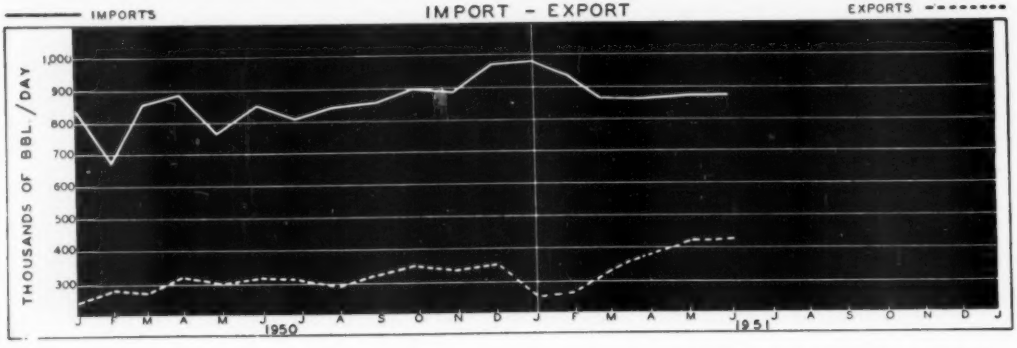












CRUDE PRICES GRAVITY SCHEDULE

	Signal Hill, Calif.‡	Oklahoma, Kansas	Gulf Coast Tex.*	West Tex.†
18-18.9	$1.93			
19-19.9	1.98			
20-20.9	2.03	$2.25		$2.12
21-21.9	2.07	2.27		2.14
22-22.9	2.12	2.29		2.16
23-23.9	2.18	2.31		2.18
24-24.9	2.24	2.33	$2.56	2.20
25-25.9	2.30	2.35	2.58	2.22
26-26.9	2.36	2.37	2.60	2.24
27-27.9	2.41	2.39	2.62	2.26
28-28.9	2.46	2.41	2.64	2.28
29-29.9	2.52	2.43	2.66	2.30
30-30.9	2.57	2.45	2.68	2.32
31-31.9	2.62	2.47	2.70	2.34
32-32.9	2.68	2.49	2.72	2.36
33-33.9		2.51	2.74	2.38
34-34.9		2.53	2.76	2.40
35-35.9		2.55	2.78	2.42
36-36.9		2.57	2.80	2.44
37-37.9		2.59	2.82	2.46
38-38.9		2.61	2.84	2.48
39-39.9		2.63	2.86	2.50
40 and above		2.65	2.88	2.52

*For crude from Daboval, El Campo, and Sand Point.

†Includes Lea County, New Mexico. Last general price change represented a 50-cent increase becoming effective December 6, 1947.

‡Standard Oil Co. of California.

FLAT CRUDE PRICES

Representative posted schedules per barrel.

East Texas†	$2.65
Kettleman Hills, California*	2.90
Beauregard Parish	2.60
Illinois Basin	2.77
Pecos County, Texas (Yates)	2.35
Bradford, Pennsylvania	4.25
Eastern Ill. and Western Ind.†	2.77
Tomball, Texas Gulf Coast	2.83

*37°-37.9°. †35° and above.

PRICE cutting at service stations in New Jersey reached a peak over the Labor Day week end. In some of the northern counties of the state dealers were posting prices that ranged from 4 to 6 cents below normal. The New Jersey Gasoline Dealer Association estimated that 2,500 dealers would be affected, and the Gasoline Retailers Association of New York forecast that station sales in New York City over the Labor Day week end would be down to about half of normal volume. Most of the price cutting has been confined to regular-grade gasoline.

The general upward trend in tanker rates has been one of the major reasons for the rapid rise in product stocks on the East Coast during the summer months. Rates for spot shipments dropped to the Maritime Commission base for short periods. This would represent a Gulf-East Coast shipping cost of about .91 cent a gallon for No. 2 fuel. However, charters, covering deliveries during the fall and winter months, are at MC plus about 50 per cent or 1.36 cents a gallon for No. 2 fuel. If tanker rates reach expected levels during the winter months, some price adjustment will have to be granted for home-heating fuel suppliers on the East Coast.

The recent increase in rail rates for tank-car shipments out of the Group 3 area represents a refinery price cut of about .125 cent a gallon for products moved by rail from Mid-Continent refineries to northern points. This is true since the supplier in the Group 3 area must compete at delivery points with prices based on movement by pipe lines plus transport trucks. In general, the new rates replace the temporary increase of 2 per cent, granted last spring, with a boost of 6 per cent for a net gain of slightly less than 4 per cent.

REPRESENTATIVE QUOTATIONS

Representative spot-market quotations of leading suppliers as of September 4, 1951. Figures are f.o.b. plant for tank-car shipments in cents per gallon, except for residual fuel oil which shows the price per barrel and wax, in cents per pound.

GASOLINE, KEROSINE, AND FUEL OILS

	Mid-Continent Group 3	New York Harbor (barge)	Texas Gulf Coast
Regular gasoline, 80-82 octane	10¼-10½	12-12.75	10¾-11
Premium gasoline, 86-88 octane	11¼-11½	13.5-13.75	11¾-12
42-44 w.w. kerosine	9-9⅜	10	9
No. 2 straw fuel oil	8-8⅜	9	8
No. 6 residual	$1.70-1.80	$2.45-2.60	$1.75-1.90

NATURAL GASOLINE

	Group 3	North Texas	N. La.
Grade 26-70	5½	5	5¼
Grade 18-55	6.6	6.1	6.35

LUBRICATING OILS

South Texas

200 vis., No. 2-3 neutral	13-13.5
750 vis., No. 3-4 neutral	16
2,000 No. 5-6 neutral	18-19

LUBRICATING OILS

Mid-Continent

150-160 vis., D bright stock, 0-10 pp.	29-30
200 vis., No. 3 neutral, 0-10 pp.	17.5-18.5

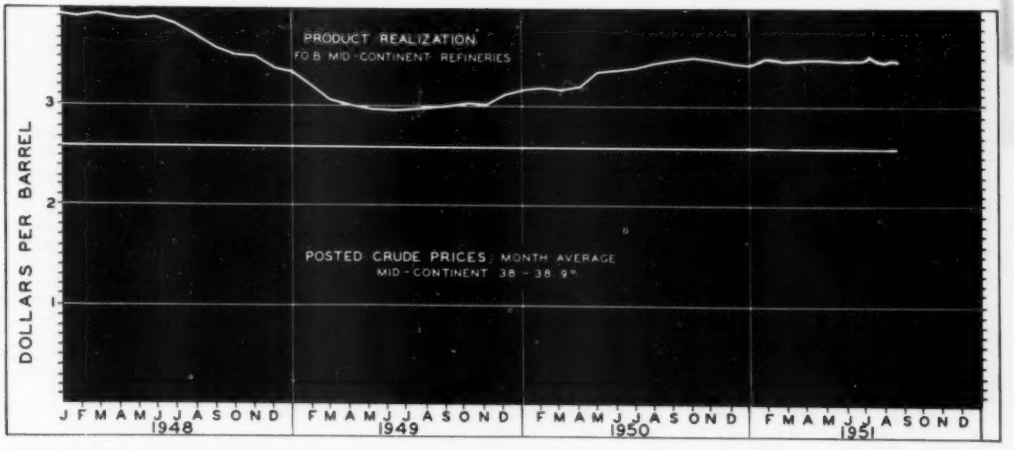
Western Pennsylvania

145-155 vis., 10 p.t. bright stock	32.5
180 vis., 0 p.t. neutral	31.5

WAX

Mid-Continent

132-134 A.M.P.	6.0


PRODUCT REALIZATION
F.O.B. MID-CONTINENT REFINERIES
POSTED CRUDE PRICES: MONTH AVERAGE
MID-CONTINENT 38 - 38.9°
DOLLARS PER BARREL
3
2
1
J F M A M J J A S O N D
1948
F M A M J J A S O N D
1949
F M A M J J A S O N D
1950
F M A M J J A S O N D
1951

In this trend chart refinery realization is based on average Mid-Continent grade crude oil (not 38° gravity only) and average prices for refinery products as published in The Oil and Gas Journal basis Oklahoma (Group 3). Refinery yields confined to gasoline, kerosine, distillate, and fuel oil. Realization averaged $3.47 for week ended August 25, $3.50 for previous week, and $3.47 for August 1950.

Plant Rehabilitation

(Continued from page 63)

ment, the refinery laboratory, the personnel office, change-house and the main warehouse.

Shutdown. — The management decided to shut down the refinery July 13, although it was still hoped at that time that the flood waters, which had been rising for several days, would not reach the plant. This work started at 11 a.m. and by 9 p.m. the plant was shut down and all employes were out of the flood area. The water had reached part of the plant by that time, although the highest waters of up to 15 ft. did not materialize until the evening of July 14 after a break in the main levee.

The catalytic cracking plant was completely shut down in 8 hours, although ordinarily about twice that time is required. The fires were cut off and steam injected into the furnaces, and they were below ignition temperature before the water arrived. Most of the furnaces are the panel type and this aided in cooling the furnaces rapidly.

Oil was cut out of the reactors with the circulation of the catalysts continuing until the hoppers were emptied. The fractionating system was blocked off. Four large gas compressors were shut down and protective measures taken. The 6,000-hp. blower, which consumes 70,000 lb. of steam hourly, was shut down after it was no longer needed in shutting down the rest of the unit. All vessels which are operated at high temperatures were cooled sufficiently so there would be no danger of flash should oil be brought in with the flood waters.

Fortunately, the control room for the catalytic unit is located on the second floor above the crest of the flood. The regenerator, which carries 1,000° F. operating temperature, was above the flood line. There was time to move some of the smaller equipment from the ground floor to the second floor but most of the electrical installations were covered with water as was the case throughout the plant.

The same procedure was followed at the lubricating-oil plant, the gasoline-recovery plant, the polymerization unit, the large vacuum installation, the asphalt plant, and all other processing units. All equipment was sufficiently cooled so there were no explosions when the flood waters arrived and there was no serious damage to furnaces and other facilities.

Electrical equipment. — The greatest damage was to the electrical equipment, and 850 motors plus countless other pieces were removed as soon as the water receded. In addition to motors this includes switch gears, motor starters, instruments, and all types of controls.

Some of the motors were dried in placed by pulling rotors and installing hoods connected to furnaces fueled with oil. Other units were dried and repaired at outside shops at points extending from Borger, Tex., to Chicago. Part of the electrical equipment had to be replaced and part was sent to factories for repairs. Company cars, trucks, airplanes, and the railroads were used to expedite this work. All equipment was carefully marked and identified and when returned was quickly installed.

While this was being done, other crews were cleaning and repairing pumps. Portable pumping units were brought in before the waters had entirely receded in order to remove as much as possible of the several inches of muck that settled in the buildings and on the ground. Connections were later made to city water mains to finish the cleanup job so that the rehabilitation of equipment could get under way.

In the cleanup work excellent results were obtained by the use of detergents with portable self-contained pumping units. Some of this work could not be completed until steam was available. The muck was foul smelling, containing all the debris that would be expected in a flooded urban area. Health-protection measures were taken, including typhoid inoculations for all employes. These inoculations were given by the regular refinery medical staff to all employes and their families.

The protection of tankage was a major part of the shutdown program. The probable crest of the flood was estimated and the tankage filled so that it would not float. Products were transferred from one tank to another in carrying out this program.

Where necessary, water was pumped into tanks containing products in order to assure full protection from floating. In some cases tanks were emptied and the manholes opened so that the flood water would flow into them and hold the tanks on their bases. All tankage was "blocked" (i.e. valves closed at the tanks). This operation, covering large storage of both crude oil and products, was entirely successful, only one tank moving a short distance from its base, without damage to other tanks, and no leaks. Had this program not been carried out as explained, leakages could have resulted which would have greatly increased the danger of fire and consequent damage to property throughout the entire area.

When the flood threatened, the warehouse department bought six rowboats. They were equipped with explosion meters in order to determine the presence of explosive mixtures. The boats were utilized in patrol work, the main objective being the detection of oil leaks. They were also used by the local police and the Kansas National Guard throughout the entire industrial area.

Short-wave radio. — The patrolling included the establishment of lookouts and installation of flood lighting and the use of short-wave radio. Those in charge are complimentary of this equipment which became especially valuable after telephone service in the entire area was no longer available.

The Phillips refinery regularly uses 20 of these units in plant operation in cars, trucks, and buses, with stationary installations scattered around the plants. This number was increased to 36 during the flood, including "walkie-talkie" units for those in charge of phases of the flood rehabilitation work. Connections were made to the police force and Army, and this type of communication proved effective in coordinating all phases of flood work in the entire area.

The last facilities to be shut down were the boilers of two power plants. The steam was used as long as possible in shutting down the distillation operations and for power purposes. The furnaces were quickly cooled and no serious damage resulted from the water. The steam plants were the first to resume operations.

The organization of manpower of the refinery and the coordination of plant rehabilitation with that of outside flood agencies including the local police, National Guard, and the Red Cross, were outstanding accomplishments of the plant management. In the entire operation no employes suffered injuries.

Rehabilitation. — None of the 1,300 plant employes was laid off. They were organized in shifts for the rehabilitation work, carried on 24 hours daily, and the employes generally were willing to do whatever they were asked to do regardless of their regular type work.

Process operators became assistants to electricians; office employes operated portable pumping units; and large groups from all departments were engaged in the cleanup work. So far as possible outside service organizations were employed, but the bulk of the rehabilitation work was done by company employes. During the flood, groups of employes aided in repairing levees and did other work which aided the flood victims.

Approximately 40 Phillips employes had their homes in the flooded areas. In some cases their homes, including all furnishings, were completely destroyed. The company is providing cash grants up to $2,000 per family and is furnishing additional funds without interest over a 3-year period for the rebuilding and refurnishing of homes.

The Frank Phillips Men's Club and the Jane Phillips Sorority, employe organizations of the Phillips company, are raising $8,000 for approximately 100 children of Phillips employes in this area who were flood victims.

EQUIPMENT MEN . . . in the News

Alliger and Sears at New Houston Location

Hugh O. Sears bought the interest of W. T. Alliger in the firm of Alliger & Sears Co., manufacturers' representatives, Houston. Alliger has retired from business.

Recently the firm has moved headquarters from 5646 Navigation to 2203 Fannin in Houston.

The company represents Cochrane Co., DeLaval Separator Co., Morris Machinery Works, Schutte & Koerting Co., and Martin Quaid Co.

McKay Is President of New Geophysical Firm

The Continental Geophysical Co., Fort Worth, has completed its organizational plans and is in active operation, according to A. E. (Sandy) McKay, president. Continental Geophysical will furnish contract seismograph crews to the industry, act as consultants on exploration problems, and engage in reanalysis of geophysical data.

McKay, after graduating from Oklahoma University, was employed for 9 years by Indian Territory Illuminating Oil Co., Bartlesville, Okla., as a geologist and geophysicist. He later became assistant chief geophysicist for Atlantic Refining Co., and in June 1950 he accepted the executive vice presidency of Southern Geophysical Co. McKay's exploration experiences have included geophysical work in the Mid-Continent and Rocky Mountain states.

Aluminum Ore Co. to Boost Production of Alumina

Plans for increasing the nation's alumina producing capacity by 180,000 tons annually, through the addition of new production facilities at an existing plant in Mobile, Ala., have been announced by Allen B. Williams, president of Aluminum Ore Co., a subsidiary of Aluminum Co. of America.

Alumina (aluminum oxide) is the material obtained from bauxite ore as the major preliminary step in the production of aluminum and of alumina chemical products. About 2 lb. of alumina are used in producing 1 lb. of aluminum.

Aluminum Ore Co. is also currently erecting a new alumina works at Bauxite, Ark., in addition to operating plants at Mobile and East St. Louis, Ill.

The new construction program together with the capacity being added in Arkansas, will boost the Alcoa subsidiary's alumina production capacity by approximately 70 per cent when completed. Construction at Mobile is scheduled to begin in the immediate future, and production of alumina is expected to start by late 1952.

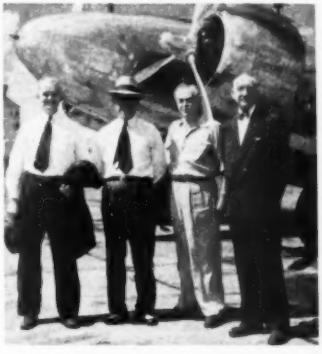
R-M Names Gow to New Sales Position

David E. Gow has been named assistant to George W. Marshall, Jr., Raybestos-Manhattan, Inc.'s vice president of asbestos products sales.

During his 6 years with the company, Gow has served as sales manager of Raybestos-Manhattan's packing division and has been in charge of the United States Asbestos Division's sales of brake lining and clutch facings to original equipment manufacturers.

Gow will continue to make his office at the company's Manheim, Pa., plant.

Magcobar, Dresser Men Make Inspection Tour



Magcobar and Dresser officials left Houston recently for a 2-week inspection tour of Magcobar mining and manufacturing facilities in New Mexico, Colorado, Wyoming, and Canada. They are: from left to right, A. J. Eastham, assistant secretary and treasurer of Magcobar; Willard M. Johnson, president of Magcobar; J. B. O'Connor, executive vice president of Dresser Industries, and W. C. Ray, asistant to the president of Magcobar.

Grant Oil Opens New Sales and Service Branch

Grant Oil Tool Co. announces the opening of a sales and service branch at Compton, Calif., under the management of Curt Linkey, experienced oil operator. The new branch is equipped with adequate warehousing space and facilities in order to improve and expedite sales and service in the Los Angeles Basin.

Blaw-Knox to Erect Stanolind Stripper Unit

Chemical Plants Division of Blaw-Knox Co. has received a contract from Stanolind Oil & Gas Co., Tulsa, for the engineering and supply of a gasoline stripping unit to be erected at the Gilliam gasoline plant near Shreveport.

To be a standard Blaw-Knox package-type model, the unit will be designed to process 1,500,000 cu. ft. of gas per day at a pressure of 350 psi. and a temperature of 100° F. It will be equipped with a water-cooling system and a safety shutdown.

Marley Resumes Production At Kansas City Plant

Three weeks after being inundated by recent floods in the Missouri and Kansas river valleys, The Marley Co., Inc., resumed production of cooling towers and mechanical equipment at its Kansas City plant. The Marley plant was the first to resume full operation in the flooded Fairfax industrial district.

During the emergency period all production and service functions of the company were assumed by its plants in Louisville, Stockton, Calif., and Houston, where stocks of products of the Kansas City plant are maintained or can be manufactured.

Dowell Makes Perforating Service Available

Perforating service employing a new development, the glass gun, is now available in the West Texas and New Mexico area, Ralph Smith, district manager for Dowell Incorporated, Midland, Tex., announced recently. The new glass gun, developed by Dowell, is a self-destroying gun which allows the use of a larger explosive charge than do other types of guns, and is being used to good ef-

fect both in casing perforating and in open hole shooting.

Midland is the seventh district in which Dowell Perfo-Jet Service is available. The others are Illinois, Oklahoma, Kansas, North Texas, Michigan and Canada.

Offices and stations in the Midtex area are located at Lubbock, Levelland, Kermit, Big Spring, Post, Odessa, McCamey, Snyder, Tex., and Aztec, Artesia, and Hobbs, N. M.

General Controls Buys Grayson-Greenamyer Assets

William Ray, president, General Controls Corp., has announced the completion of a transaction whereby General Controls has purchased the assets of Grayson-Greenamyer, Inc., Monrovia, Calif. Richard Grayson, former president of Grayson-Greenamyer, will take over as general manager of the newly formed Grayson-Greenamyer Appliance Controls

JOSEPH FALLON

HENRY SAFFORD

Division plant. George Greenamyer has been appointed works manager, and John Grayson will be retained as director of research and development.

Joseph Fallon, formerly in charge of the General Controls office in Cincinnati, has been appointed factory branch office manager in Columbus, Ohio, and Henry B. Safford, Jr., has been appointed to the position of advertising and sales promotion manager, according to J. F. Ray, vice president in charge of sales for General Controls.

Concluding arrangements for the sale of Grayson-Greenamyer to General Controls are: Richard Grayson, president; William Ray, John H. Grayson, J. F. Ray, and George Greenamyer.

Globe Opens Three New Field Stores

Tom Ashe and Jack Goodwin, Globe vice president and chief engineer, respectively, were on hand at the opening of the Duncan (left) and Odessa (center) stores. At right is shown the new Ventura store.

Development of Globe Oil Tool Co.'s sales and service organization has necessitated the opening of three new and larger stores in Ventura, Calif., Odessa, Tex., and Duncan, Okla., as announced by Charles E. Whittaker, president.

Clark Speirs and Warner Greer will work out of the Duncan store; H. D. (Spec) Donham will make his headquarters at Odessa. Harold Mears and "Doc" Cook will service the Ventura area from the new Ventura store.

Minneapolis-Honeywell Names New Sales Engineers

In further recognition of the increased tempo of the national defense program, Minneapolis-Honeywell Regulator Co. has added 33 new sales engineers to 23 strategic defense areas throughout the country.

The entire group, it was announced by William H. Steinkamp, field sales manager of the company's Brown Instruments Division, recently completed a comprehensive course in industrial instrument maintenance and repair. The men and cities to which they were assigned are:

Albert F. Sommer, New York City; John E. Tutty, East Orange, N. J.; James V. Collins and Robert F. Trump, Boston; Walter J. Loughran, Providence; George S. Raab, Hartford; John M. Caylor and George A. Stiftinger, Philadelphia; David Y. Drummond, Wilmington; Roy W. Freeman, Atlanta; Charles O. McAtee, Jacksonville; James T. Emerson, Greenville, and Robert D. Clarke, Mobile; Donald P. Moreland, Cleveland; Joseph A. Hamblin, Columbus, Ohio; John E. Flaherty, Dayton; Jack W. Larsen, Wilton A. Bass and Vendel W. Immel, Detroit; Thomas H. Jenkins, William H. Johnson and John L. Matter, Chicago; Paul K. Webster, Indianapolis, and Philip A. Barker, St. Louis.

Also Malcolm L. Johnson, Twin City; Warren G. Hardy, Carl T. Stevens and Herman R. Hampton, Houston; Bernard J. Alberts and Julius H. Matherne, New Orleans; George W. Leggett, Tulsa, and Frank G. Fischer and Michael J. Joncich, Los Angeles.

Barney Is Made Sales Executive for Roebling

J. C. BARNEY

Appointment of James C. Barney as assistant manager of sales for the wire-rope division of John A. Roebling's Sons Co. has been announced by E. C. Low, vice president of sales. Barney's new headquarters are at the firm's home office, Trenton, N. J. He replaces the late George B. Stoess.

Barney has been associated with Roebling for the past 26 years, having started as a clerical assistant at the company's Los Angeles office. In 1947 he was promoted to assistant manager of the Los Angeles district office, as well as handling oil-field accounts, which position he held until his recent appointment.

Smith Joins Sollberger

Sollberger Engineering Co., Inc., Marshall, Tex., has announced the joining of William F. (Bill) Smith with the company in the capacity of works manager.

Your MARKET PLACE FOR THE OIL AND GAS INDUSTRY...

CLASSIFIED ADVERTISING

DISPLAY CLASSIFIED
$12.00 a column inch one issue . . .
10% Discount three or more issues.

UNDISPLAYED CLASSIFIED 12c a word one issue. 10% Discount three or more issues. $3.00 minimum charge. Blind Box in our care counts nine words. Payable in Advance.

EQUIPMENT FOR SALE

USED ROTARY AND CABLE TOOL DRILLING TOOLS, WIRE LINES, E. A. KELLY, BOX 861, OKLAHOMA CITY. PHONE 5-6407.

JUNIOR Model Wilson Double Drum Draw Works powered by Buda Model K425 motor, mounted on trailer with telescoping mast, platform, pipe rack, Oil Well rotary and swivel, block and hook, kelly, friction cat head. Drill to 3600 workover to 6000. Located in East Texas. $5000.00. Contact K. Dahl, 2415 Ave. G, Rosenberg, Tex.

IMMEDIATE delivery complete workover Jackknife rig, and Lowboy mounted Cardwell, Model L, Power Waukesha GKU with 87 double leg mast and wire line and substructure. Details and price on application. Box 3246, Corpus Christi, Texas.

FOR SALE near Seminole, Oklahoma: One Braun, Size G portable distillation unit complete, Serial #7190, located in 24' x 40' x 18' Stefco steel frame sectional steel building. Price $10,000. Cities Service Oil Co.—Patridge—Bartlesville, Oklahoma.

EQUIPMENT FOR SALE

All or any unitized item of steam drilling rig. Has made one 8,000-ft. well only. National type 34, 8½-in. oil bath draw works, Parkersburg 136-ft. derrick, 12-in. by 12-in. Ideal engine, two 20-in. Wilson Snyder pumps, Oil Well 350-ton companion blocks, B-J 4300 Super-tripiex hook, Gray 500-ton swivel, 4¼-in. and 5¼-in. Kelleys, drill collars, complete boiler feed unit, direct driven dreadnaught coring unit, direct driven National M S 20½-in. rotary, two Cameron 13⅝-in. Q R C preventors with all accessories for complete hookup, and lesser equipment to complete rig. All equipment is in strictly first-class condition. Call or write

OILFIELD SALVAGE CO., INC.
P. O. Box 2589 Phone Ch-6914
Houston, Texas

26" O. D. WELDELLS

NEW 26" O.D. x ⅝" Wall Grade "B" Long Radius Seamless Steel Welding Ells. Recommended for 750# ASA Natural Gas Working Pressure.

20	16 degree	Bend
33	19 "	"
23	22 "	"
4	25 "	"
4	28 "	"
5	31 "	"
4	34 "	"
20	37 "	"
22	40 "	"
40	45 "	"

Available for immediate shipment at reduced prices.

THE McJUNKIN SUPPLY CO.
Charleston, W. Va.
P.O. Box 513 — Phone 26-143

EQUIPMENT FOR SALE

FOR CABLE TOOLS
DEGEN PIPE AND SUPPLY CO.
Box 107, Red Fork Station, Tulsa, Oklahoma

FOR SALE: Pressure Tank 53" Dia. 40' long, 9/16" Shell. Riveted construction. Excellent condition. Price .06c pound, loaded truck or car. M. KAPLAN & SON, Pipe, Machinery, Supplies, Monroe, Louisiana.

FOR SALE: Seamless casing and tubing new and second hand. Phone Rogers Pipe and Supply Co., Tulsa, Okla.

1—36-L Bucyrus-Erie Spudder, Natural gas, gasoline. Galvanized sectional house, floor, timbers, and walk. A complete string of tools for 10", 8", 6", and 5" holes, casing tools for same. Everything necessary to drill with. Box 146, Wellington, Ohio. Phone 69K.

Oil Country TUBULAR GOODS

Completely equipped, well established fabricator has production time available to convert your seamless tubing and pipe by upsetting, threading and hydrostatic testing, to A.P.I. Specifications.

Plant location is on main line railroad within the Pittsburgh switching zone.

Phone or Write
McKeesport 4-9107
Box 465, McKeesport, Pa.

EQUIPMENT FOR SALE

CASING PULLING CONTRACTORS with Hydraulic Equipment: Experienced operators—Pull any size pipe, anywhere. Also will buy wells for salvage. GENERAL CASING PULLING CO., P.O. Box 4387, Oklahoma City. Phone 6-1335.

8" COLLAR BARGAIN
Cleaned $1.75 lots 500 Dallas Columbia Supply. 911 E. Independence, Tulsa, Oklahoma.

STAR DRILLER No. 71 and tools. Truck Mtd. Priced to sell. Ph. or write G. J. Stumpff, Goodyear, Ariz.

CASING

Have 6,000' of 9⅝" 36 lb. J-55 Seamless Casing on order for third quarter delivery. Would like to trade this tonnage for 5½" or 7" seamless suitable for 9,600' well. Phone 3-8601, Shreveport, Louisiana.

FOR SALE

Good Used 48-L and 36-L Bucyrus-Erie Drills—Complete with Tools

BEACON SUPPLY COMPANY
Box 398 Pampa, Texas Phone 3377

TUBING FOR SALE

USED SEAMLESS STEEL TUBING:

36,000'	1½"	O.D. x .135" Wall	1.62# 14' Lengths and Over.
50,000'	2"	O.D. x .140" Wall	2.70# 14' Lengths and Over.
100,000'	2¼"	O.D. x .120" Wall	2.37# 14' Lengths and Over.
20,000'	3"	O.D. x .150" Wall	4.06# 14' Lengths and Over.
10,000'	3"	O.D. x .150" Wall	4.06# Lengths Under 14'.
20,000'	3¼"	O.D. x .135" Wall	4.49# 14' Lengths and Over.
3,000'	3¼"	O.D. x .135" Wall	4.49# Lengths Under 14'.
50,000'	3½"	O.D. x .135" Wall	4.85# 14' Lengths and Over.
80,000'	4"	O.D. x .150" Wall	6.17# 14' Lengths and Over.
8,000'	4"	O.D. x .150" Wall	6.17# Lengths Under 14'.

UNUSED SEAMLESS STEEL TUBING:

50,000'	2"	O.D. x .125/.160" Wall	3.01# 14'-26' Lengths.
10,000'	2"	O.D. x .170/.210" Wall	3.80# 10'-16' Lengths.
20,000'	2½"	O.D. x .130/.160" Wall	3.72# 14'-26' Lengths.
7,500'	2½"	O.D. x .175/.215" Wall	4.68# 16'-26' Lengths.
10,000'	3"	O.D. x .125/.160" Wall	4.70# 16'-26' Lengths.
40,000'	3"	O.D. x .270/.320" Wall	8.7# 20'-40' Lengths.
5,000'	3¼"	O.D. x .125/.160" Wall	5.25# 16'-22' Lengths.
10,000'	3½"	O.D x .130/.160" Wall	5.3# 16'-24' Lengths.
5,000'	3¾"	O.D. x .370/.438" Wall	14.5# 10'-20' Lengths.
10,000'	4"	O.D. x .140/.170" Wall	6.5# 14'-21' Lengths.

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A. J. STRUBEL, Broker

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EQUIPMENT FOR SALE

PIPE
ALL SIZES; LINE PIPE AND CASING, TANKS, AND OILFIELD SUPPLIES. EDCO PIPE & SUPPLY CO., PHONES 933 OR 1298, DRUMRIGHT, OKLA.

FOR SALE: Cardwell L draw works with air operated Twin Disc clutches, transmission, GAK Waukesha. Good condition. CLAYPOOL DRILLING COMPANY, St Elmo, Illinois.

FOR SALE at Ponca City Refinery—1 used Westinghouse Air Brake Co. No. 3-T Triple Valve Test Rack. Cities Service Oil, Patridge, Bartlesville, Oklahoma.

FOR SALE: R. L. Cardwell with GAK Waukesha. 1st class condition, $5,000. One super model Wilson single drum servicing unit, 80 hp. Waukesha, 4,000' wire, all tubing tools, mounted on GM 4-wheel drive truck. $3500. Phone Rogers Pipe and Supply Co., Tulsa, Okla.

FOR SALE

10,000 FEET 4" O.D. x .054" WALL SEAMLESS ALUMINUM TUBING

Spec. Alcoa 63 St 6—40 ft. Lengths

Working Pressure to 250 P.S.I.

Excellent for irrigation line, water service, etc.

Complete with galvanized 4 bolt Dresser Heavy duty couplings

ALL USED ONLY FEW MONTHS—CONDITION PERFECT

Prompt Shipment subject to prior sale. Price including couplings—51c foot

F.O.B. White Haven, Pa.

L. B. FOSTER COMPANY

New York City—Pittsburgh—Chicago Houston

EQUIPMENT FOR SALE

502 FEET 10-inch seamless casing, like new, 40 pound, 8 V threads. $5.00 foot. Near Tulsa. 1208 E. 20th St., Tulsa. Phone 3-9232.

40 H.P. HOPE Direct Driven Gas Engine Compressor. Year 1928. Now Operating. Specifications on request. Price $650.00. L. C. Young, Sample Bldg., Morehead, Ky.

FOR SALE: U-15 rotary rig in first-class condition. Has 3 NKU Waukesha motors with less than 1 year service. Without mast or drill pipe. $80,000.00. Will consider good 4000 ft. rotary as part payment. Box E-286, The Oil and Gas Journal, Tulsa, Okla.

FOR SALE at Russell, Kansas: 1 Durnell Universal Back Crank Pumping Unit. $250.00. Cities Service Oil Company, Patridge, Bartlesville, Oklahoma.

PIPE

2000 Ft.—6⅝" OD X 19.45# New Black South Chester Tube Company—Lapweld Drive Pipe—T&C. Immediate Shipment.

Regular Published Warehouse Price
F.O.B. Houston Subject Prior Sale

L. B. FOSTER CO.
1721 Commerce Bldg., Houston, Texas

Wire: WUX-HOUSTON
Phone: Blackstone 3261

Two 175 H.P. HEINE BOILERS

Type "M" 250 pound pressure. Good condition. Prompt shipment. Tubes 3½" diameter No. 9 B.W.G.

Wire, write or phone for price.

X-755

EQUIPMENT FOR SALE

FOR SALE at Madison, Kansas: Used 8" x 3¼" x 8" Ingersoll-Rand Vertical 2 Stage Compressor Unit, Serial #PP63278 for belt drive. $250.00. Cities Service Oil Company, Patridge, Bartlesville, Oklahoma.

FOR SALE at Ponca City Refinery: 1—5' by 20' Used Vertical Concentrator, 2 Piece Shell ⅜" Steel, Heads 1", Vertical Seams Double Buttstrap, Triple Riveted; Girth Seams, Lap Joints, Double Riveted; All Seams Welded Inside and Outside; Rivet Heads Welded Outside; Original Test Pressure 500#. $850.00. Cities Service Oil, Patridge, Bartlesville, Oklahoma.

Used Duplex 4½" x 6" Power Pumps with Chrysler C-36 Engines, skid mounted immediate delivery. Also Byron Jackson Carter Centrifugal Units. Westinghouse 20-25-30 KW Generating Units.

H. H. COFFIELD
Attn.: W. H. ORR
Phones: 132—Rockdale, Texas
AT-3427—Houston, Texas

NO. 1 USED SEAMLESS CASING

5½" O.D. 14 lb. 8 round range 2
5½" O.D. 15.5 lb. 8 round range 2
5½" O.D. 17 lb. 8 round range 2

NO. 1 USED SEAMLESS NON-UPSET TUBING

2⅞" O.D. 6.40 lb. 8 round range 2
3½" O.D. 9.20 lb. 8 round range 2

FRANK MORRIS & CO.
424 So. Cheyenne, Tulsa, Oklahoma
Phone 2-5248

FOR SALE—SHOPPED AND TESTED

15000'—5½" OD 14# Seamless R-2 8R—once run casing.
8000'—7" OD 17# Seamless R-2 8R Casing—once run.
5000'—7" OD 20# Seamless R-2 10V Casing.
5000'—7" OD 24# Seamless R-2 10V Casing.
10000'—2⅞" EUE 8R R-2 Seamless Tubing—once run.
10000'—2⅞" EUE R-2 10V Seamless Tubing.

We also carry a large line of Lapweld Casing and Tubing. Please call us.

SABINE MACHINE & SUPPLY CO.
Phones 3094-3095-3436 Kilgore, Texas

FOR SALE

One Brewster Rotary Oil Well Drilling Rig Complete. Jackknife Derrick, Waukesha Motors, Just finished drilling a well 5 miles east of Cisco, Texas. *The Rig is in Perfect Condition.* Anyone interested can get me at

Catron, Missouri, Phone Number 4237

FOR SALE
PIPE TANK EQUIPMENT

Approx. 7 miles 3" & 4" T. & C. line pipe
14 Joints 5⅞" drill pipe & joints
3 65 Brl. 1 ring chrome deck bolted tanks
1 500 Brl. 2 ring chrome deck bolted tank
1 1,500 Brl. 3 ring chrome deck bolted tank, insulated
2 2,000 Brl. 2 ring chrome deck bolted tank with coil and boiler
2 3,000 Brl. 3 ring chrome deck bolted tank
Tanks and line pipe new in 1949
1 Allis-Chalmers model A. D. 4 Grader
1 Caterpillar No. 28 ripper

All of above material is now located near Craig, Colorado, and is offered subject to prior sale.

R. H. TECKLENBORG CO.
811 W. 7th St., Los Angeles 17, Calif., Phone TRinity 2-091

TOWERS and EXCHANGERS

1—7'6" ID x 72' OVERALL x 1.58" THICK TOWER

470# w.p. 4'5" of shell and all nozzles and manways Hastelloy lined, wt. approx 190,000#.

2—7' ID x 117'6" OVERALL TOWERS

Shell 1¼" and 1⅛", top head 1¼", bottom head 1⅛", 50 CI bubble trays w/49 and 43 caps per tray on 24" and 30" spacing, wt. 206,580#.

1—CONDENSER, 2035 SQ. FT. SURFACE

Single pass shell, 6 pass tubes, 648—¾" O.D. Seamless steel tubes, 13 BWG, 16' long, 1" sq. pitch, shell 34" OD x ⅜" thick, wt. 18,268#

Please wire, phone, or write for additional information

NEWMAN'S, INC.
700 S. Maybelle, Tulsa, Okla.
Phone 2-5228—LD-635

EQUIPMENT FOR SALE

FOR SALE: Ideal slush pump, Model C-150. Melton Supply Company, Seminole, Oklahoma.

FOR SALE: 35 HP Lufkin Pumping Unit. 74 inch stroke. Complete. Excellent Condition. Arnold Pipe & Supply Company, Box 3003, Shreveport, La.

NEW ELECTRIC MOTORS
Popular brands at consumers' cost less 10%. 7½ to 30 HP, 3 phase 60 Cycle, 220-440 Volts. Splash proof, drip proof, and explosion proof. New stock ready for immediate shipment. Box E-315, The Oil and Gas Journal, Tulsa, Oklahoma.

FOR SALE: New shooting or water truck. 700 gal. vacuum loaded tank, fifteen foot pipe bed, on 1951 Dodge 2 ton, 2 speed. 8:25 tires, powder and cap boxes. Box E-320, The Oil and Gas Journal, Tulsa, Oklahoma.

FOR SALE: 1—"Caterpillar" D-17000 Diesel Electric set, 440 V, 3-phase, 60 Cycle, AC radiator W/blower fan, safety device, muffler, and Firestone vibration dampeners. 2—Fuel Tanks and connections. 1—Steel Building for Caterpillar. Terms Cash. Can be seen at our McMackin Lease, 3 Miles West of Salem, Illinois. No Junk. Absher & Booth, 721 Thompson Building, Tulsa 3, Oklahoma.

TUBING & CASING for Sale, all sizes and quantities, New and Used. Box E-338, The Oil and Gas Journal, Tulsa, Oklahoma.

FOR SALE: Going Independent Oil Well Cementing Business. Two well equipped trucks with all necessary equipment, located in prolific oil center servicing around fifteen jobs per month. Owner selling account sickness, should pay out in a year. Box E-331, The Oil and Gas Journal, Tulsa, Oklahoma.

WANT EQUIPMENT: Did you find the equipment you wish to purchase in this column? If not, use an "Equipment Wanted" classified advertisement to find it. It is available somewhere and Journal classified advertisements will find it. See box heading for classified rates, or write The Oil and Gas Journal.

EQUIPMENT WANTED

125 HP to 300 HP, 300-lb. working pressure boilers wanted. Near Midland, Texas. Tex Harvey Gasoline Plant, 714 Atlas Life Bldg. Phone 54-5201, Tulsa, Oklahoma.

400 OR 500 FEET of 2⅞" rge. 2 drill pipe with Hughes Flash weld tool joints. Box 384, Skiatook, Okla.

WANTED: CABLE TOOL MACHINE, depth 3500' complete with tools. Give price and location first letter. Box 198, Gorham, Texas.

WANTED to buy, an Oil Corporation that has "lost its shirt" the last two years. Wire or phone us collect. Must be a corporation. Goodall Elec. Mfg. Co., Ogallala, Neb.

WANTED—Walker-Neer 33 or Bucyrus-Erie 36 without tools. Must be a late model in good shape and reasonable. R. L. Stubble, Chatham, Ontario.

EQUIPMENT NOT IN USE: Did you find a buyer in this column for the equipment you have for sale. Someone wants it and an "Equipment For Sale" classified advertisement in the Journal will find a buyer. See box heading for classified rates or write The Oil and Gas Journal.

WANTED FOR CASH

Electric Motors—Starters, Transformers —Oil & Air Brkrs. Wire—Cable—Wiring Materials.

Send Listings

ALLIED ELECTRIC & MACHINERY CO.
1007 Falls Bldg., P. O. Box 1838
MEMPHIS 1, TENN.

WANTED TO BUY:
NEW — SURPLUS — USED
OIL STORAGE TANKS

Capacity 20,000 gallons and other sizes. Mounted or Dismounted.

Box E-336, The Oil and Gas Journal, Tulsa, Oklahoma.

HELP WANTED

FOREIGN gravity-magnetic supervisor Must be of standing in field. Top salary, subsistence, family living allowance and travel expense. Best working conditions. Our personnel has been notified. Apply Box E-252, The Oil and Gas Journal, Tulsa, Oklahoma.

A CHEMICAL Engineer—Major Oil Company Refinery in Oklahoma. State qualifications and salary expected. Write Personnel Department, Box 381, Tulsa, Oklahoma.

COMBINATION, cable and rotary, sober and industrious driller year round work, good pay. Gray Well Drilling Co., Delafield, Wisconsin.

MECHANICAL Engineer who has had actual supervisory experience in refinery or machine shop, pump, engine and turbine repair. Southwest refinery. Box E-231, The Oil and Gas Journal, Tulsa, Oklahoma.

MAGNETOMETER operator, foreign work. Top salary, subsistence, family living allowance, traveling expenses. Excellent conditions and climates. Our personnel has been notified. Apply Box E-265, The Oil and Gas Journal, Tulsa, Oklahoma.

KEY Seismograph Personnel Needed by Established and Expanding Seismograph Company. Box E-264, The Oil and Gas Journal, Tulsa, Oklahoma.

EXECUTIVE: Substantial company desires aggressive, high type, responsible executive to organize and supervise district exploration office in South Louisiana. Applicant should, preferably, be not over 40 years of age and must have had experience in analyzing and negotiating for development deals, acquisition of producing properties, proven or semi-proven acreage and analyzing geological reports; must have at least a general knowledge of drilling and gas production practice. Applicant must be able to find and initiate negotiations for proven or semi-proven properties, producing gas properties and wildcat prospects if rated as A-1; must also be able to appraise submissions. Applicant must be familiar with South Louisiana area. Primarily interested in proven or semi-proven gas properties and prospects; not interested particularly at this time, in carrying on extensive wildcat exploration activities. Excellent compensation. In replying give full details as to past experience, accomplishments and references, as well as name of present employer and position held, together with photograph. All inquiries will be kept confidential. Will not contact applicant's employer or references without first obtaining permission from applicant. Personal interview with top company officials will be arranged, at company expense, for applicant meeting above qualifications. Box E-298, The Oil and Gas Journal, Tulsa, Oklahoma.

HELP WANTED

REPRESENTATIVE WANTED—New and used Tube case, and line pipe. Liberal commission. Contact Luside Metal Co., Inc., 805 Granite Bldg., Rochester 4, N. Y.

PRODUCTION SUPERINTENDENT: Progressive independent company looking for man who knows production—look after producing and drilling wells—be able to handle men—a good job for the right man. Write, giving age, experience and salary expected. All inquiries strictly confidential. Address Box E-334, The Oil and Gas Journal, Tulsa, Oklahoma.

PRODUCTION Superintendent or Production Engineer to manage producing leases and drilling wells for small company. Experience with water flood desirable. Give experience and age in letter, and also salary required. All letters confidential. Address Box E-335, The Oil and Gas Journal, Tulsa, Oklahoma.

FOREIGN and Domestic Oil Employment Directory covering the oil industry, showing where to apply for jobs. Price $5.00. Oil Industry Mailing List, Box 2603, Tulsa, Okla.

GEOLOGIST for aggressive well established producing company. Must have at least six years experience in the Gulf Coast Area and be capable of supervising land deals. If interested, submit details of experience, military status, and salary expected. All replies will be kept confidential. Box E-318, The Oil and Gas Journal, Tulsa, Oklahoma.

EXPERIENCED Laboratory Tester for independent refinery. When applying furnish full details as to education, marital status and experience. Box E-310, The Oil and Gas Journal, Tulsa, Oklahoma.

WANTED: One instrument mechanic by independent refinery, Southwest Texas. Permanent employment for the right man. Please furnish experience and educational background, also a picture. Box E-294, The Oil and Gas Journal, Tulsa, Oklahoma.

WANTED: Technician with petroleum refining background and thorough knowledge of fluid catalytic cracking operations for technical sales position. Box E-282, The Oil and Gas Journal, Tulsa, Oklahoma.

WANTED

Aggressive purchasing agent for well established oil well supply company. General office in Oklahoma. Must be experienced in Oil Field Supplies, Drilling and Production equipment. State experience, age and qualifications—all replies held strictly confidential.

Box E-307, The Oil and Gas Journal, Tulsa, Oklahoma

WANTED

EXPERIENCED PRODUCTION SUPERINTENDENT

With Independent Company for East Texas Fields.

State age, experience, references and salary expected

Box E-312, The Oil and Gas Journal, Tulsa, Oklahoma

OPPORTUNITIES FOR TECHNICAL REFINERY PERSONNEL

for

LARGE INTERNATIONAL OIL CO.

Entertaining applications of graduate chemical, mechanical, structural and electrical engineers for refinery engineering assignments at home and abroad.

Engineers with refinery experience and also recent graduates will be considered.

Box E-143, The Oil and Gas Journal, Tulsa, Oklahoma

HELP WANTED

WANTED: One pump and engine mechanic by independent refinery, Southwest Texas. Permanent job for the right man. Please furnish experience and educational background, also a picture. Box E-293, The Oil and Gas Journal, Tulsa, Oklahoma.

WANTED: Petroleum or Mechanical Engineers for oil tool design. Field experience desirable. State age, education, experience and salary expected. Box E-319, The Oil and Gas Journal, Tulsa, Oklahoma.

ENGINEERS, Executives, Technical Men. Salaried positions—$3600 to $30,000. This confidential service for outstanding men who desire a change of connection. Will develop and conduct preliminary negotiations without risk to present position. Send name and address for details. Tomsett Associates, 1204 Berger Bldg., Pittsburgh 19, Pa.

THE POSITION YOU WANT: Oil industry companies are looking for men to fill every conceivable kind of position. If you didn't find the position in this column that you are looking for, use a "Situation Wanted" classified advertisement to state your qualifications. Some company is probably looking for your ability. See box heading for classified rates or write The Oil and Gas Journal.

SITUATIONS WANTED

FORMER Independent Oil Operator ten years, with legal education, plus eight years Wall Street experience, desires connection raise funds exploratory well drilling from excess profits taxpayers. Box D-938, The Oil and Gas Journal, Tulsa, Oklahoma.

ATTENTION: Well established oil well drilling contractor desires to manage and supervise: individuals, groups, small to medium-sized oil companies' drilling, production and operating problems in Central and Western Texas, and New Mexico. Personal interview by appointment is desired. Makin Drilling Company, Box No. 131, Ph. No. 131, Hobbs, New Mexico.

PETROLEUM ENGINEER four one-half years drilling, Development and work over experience. Age 27, Single B. S. Degree, Now Employed, Good reference. Box E-302, The Oil and Gas Journal, Tulsa, Oklahoma.

INDEPENDENT oil operator with outside income, 35 years old, married to attorney, would like position foreign country with oil company or government. Speaks French, Spanish, German and Italian. Thirteen years experience in land, seismograph crew supervision, drilling, producing, and developing Texas Gulf Coast. Three years college education. Wants to get away from high tax but would not consider anything less than a two year contract. Write Box E-244, The Oil and Gas Journal, Tulsa, Oklahoma.

PETROLEUM GEOLOGIST, 31, excellent health, 11 years experience surface, subsurface in Mid-Continent, Rocky Mountains, Gulf Coast, South America. Conversant 3 foreign languages; no military commitment. Prefer foreign assignment. Box E-301, The Oil and Gas Journal, Tulsa, Oklahoma.

OIL & GAS ENGR. desires position in pioneer development. Capable of assuming complete operational supervision. Domestic or foreign service. Box E-308, The Oil and Gas Journal, Tulsa, Oklahoma.

TWO ACCOUNTING DEGREES, 16 months accounting experience, manufacturing. Desire change to oil. Masters' thesis: "Accounting for Exploratory and Drilling Operations in Oil Industry," age 31, married, Rodney Moore, Ellettsville, Indiana.

CHEMICAL ENGINEER: M. S. Degree Economics, desires domestic or foreign position as assistant to management of oil or chemical company. Age 38. Thirteen years domestic and foreign experience refinery operations, petrochemical plant management, and process design for plant construction. Box E-330, The Oil and Gas Journal, Tulsa, Oklahoma.

EXPERIENCED REFINERY Foreign Operating Superintendent — Age 37 — Successful administrator foreign staff. Middle East, Latin American areas major operations. Box E-332, The Oil and Gas Journal, Tulsa, Oklahoma.

CONSTRUCTION SUPERVISOR — Seventeen Years experience refineries, diesel plants, power plants U. S. and foreign. Completely experienced all construction trades. Speak Spanish, some Portuguese. Box E-304, The Oil and Gas Journal, Tulsa, Oklahoma.

SITUATIONS WANTED

GRADUATE petroleum engineer, married, veteran, age 25, desires general field work with independent. Employed now and for past 2½ years as reservoir engineer with major oil company. Wish to learn field from bottom up. Prefer 7-day work week. Top references. Box 303, The Oil and Gas Journal, Tulsa, Oklahoma.

GEOLOGIST: B.S., married, draft exempt; 26 years old; one year's experience in subsurface and surface geology in South America. Interested in foreign or domestic. At present employed. Box E-300, The Oil and Gas Journal, Tulsa, Oklahoma.

TOOL PUSHER 15 years experience on large and medium size rotary rigs. Available at once. Best of references. Box E-305, The Oil and Gas Journal, Tulsa, Oklahoma.

GEOLOGIST with 2½ years experience in Texas with major company wants to relocate in Kansas with small company or independent. Box E-337, The Oil and Gas Journal, Tulsa, Oklahoma.

GEOLOGIST and Mining Engineer, Specialist with long years of experience for oil and all minerals-strata, desires expert work for limited time. Box 316, The Oil and Gas Journal, Tulsa, Okla.

CHEMICAL ENGINEER: M.S. Degree, Ten Years Experience Operations, Construction, Process Design, Instrumentation, Engineering and Purchasing. Age 35. Desire position on New Refinery Projects, Operations or Technical Sales. Presently employed. Box E-311, The Oil and Gas Journal, Tulsa, Oklahoma.

PRODUCTION SUPERINTENDENT experienced in cable and rotary tool completion and new lease development. Box E-317, The Oil and Gas Journal, Tulsa, Oklahoma.

TEXAS A&M Petroleum Engineering Graduate, Registered, Age 33, 10 Years Field Experience. Reply Box E-288, The Oil and Gas Journal, Tulsa, Oklahoma.

GEOPHYSICIST desires connection with oil company exploration department in southwest. Fourteen years experience with contract seismograph company includes computing, interpretation, crew management, special supervision, research. Box E-325, The Oil and Gas Journal, Tulsa, Oklahoma.

THE RIGHT MAN: Can you fill the position you have open from the qualifications listed in this column. Men are always looking for an opportunity to improve themselves. Use a "Help Wanted" Journal classified advertisement to find the men you need. See box heading for classified rates or write The Oil and Gas Journal.

BUSINESS OPPORTUNITIES

AGGRESSIVE subsurface geologist desires to sell to smaller company that wants to find production in southern Oklahoma—a good education and ten years' experience in Ardmore. Shall expect to grow in proportion financially, as the company grows. Box E-322, The Oil and Gas Journal, Tulsa, Oklahoma.

WANTED to buy from owner, producing oil property, preferably 1200 bbl. per day or more from either shallow or deep horizon or both. In reply please state daily production, number of producing wells, total average, potential and other essential information. Box E-327, The Oil and Gas Journal, Tulsa, Oklahoma.

ATTENTION: THOSE DESIRING TO INVEST IN OIL BUSINESS IN MID-CONTINENT AREA. Highclass Geologist, associated with competent lease man and Drilling and Production Supt., desires to contact parties wishing to invest. We can furnish Geology, take leases, do title work, work out satisfactory drilling deal, drill the well and produce it. Will take interest as compensation. Box E-326, The Oil and Gas Journal, Tulsa, Oklahoma.

LEGAL BLANKS

BURKHART LEGAL BLANKS since 1908 Oil-Gas (all states), Business, Real Estate, Legal Forms, Leases, Revised With Government Regulations, Commercial Printing Catalog and Samples on request. Burkhart Printing & Stationery Company, 115 South Cincinnati, Tulsa 3, Oklahoma

ROYALTIES

PRIVATE PARTY will invest to $200,000 cash in producing Royalties, overrides or settled production in small or large deal. Box E-236, The Oil and Gas Journal, Tulsa, Oklahoma.

MONTANA ROYALTIES

Millions of acres now leased by world's major companies, with huge drilling play in prospect. For booklet describing Montana geology and oil development, write Landowners Royalty Company, Box 1225, Great Falls, Montana.

GET TOGETHER: Both Capital and Royalties are available. If the investment proposition you want isn't listed in this column, use a Journal classified advertisement to find it. See box heading for classified rates, or write The Oil and Gas Journal.

LEASE AND DRILLING BLOCKS

THE Oakland uplift N-E Coles County, Illinois. Has three oil sands above 1,000 ft. Have 1,000 acres of selected leases. Sam J. Burkitt, Moweaqua, Ill.

FOR SALE: Oil and Gas Leases adjoining producing leases, also wildcat leases, drilling propositions and small producing properties; all in shallow territory. W. P. Harley, Bowling Green, Ky.

IF you are interested in LEMMON-WILLISTON basin of SOUTH DAKOTA write me. Minerals, leases, drilling blocks, royalties or over-rides also represent you at State School Land auctions. JOHN F. SCHOOF, GETTYSBURG, S. D.

6.500' 5½" 15.5 lb. J-55 Long T&C casing available for interest in producing oil or gas well. Box E-296, The Oil and Gas Journal, Tulsa, Oklahoma.

WANTED: Will purchase acreage to support wildcats in Kansas, Colorado, and Nebraska and consider drilling deals western Kansas and Julesburg Basin area. Submit details to Box E-295, The Oil and Gas Journal, Tulsa, Oklahoma.

PRODUCTION FOR SALE: 48-acre oil lease, 4 wells producing, two pay sections of Strawn Oil sand 1500 ft. and 1600 ft., new field, last well completed Aug. 20th, 1951, potential 31½ bbls. per day of 40 gravity oil. Five or more proven locations to drill. For quick sale price $100,000—O. B. Klein, P.O. Box 464, Taylor, Texas. Phone 307.

105 Royalty Acres (interest) under deep well (13,500') Drilling now. Located near Ft. Stockton, Texas. $20 per royalty acre. Box E-328, The Oil and Gas Journal, Tulsa, Okla.

FOR LEASE: The west 80 acres of the northwest ¼ of Section 21 T. 13 R. 34 in Northwest Lea County, N. Mexico. D. H. McDaniel, 3215 Fairway Drive, La Mesa, California.

DRILLING DEALS — WEST TEXAS

We are in position to offer drilling deals on good geology to independents and companies. Will furnish complete data upon request. Reply:

Box E-333, The Oil and Gas Journal, Tulsa, Oklahoma.

LEASES ROYALTIES

Producing and Nonproducing Bought and Sold—Any Area Inquiries Invited

B. D. BUCKLEY

6635 Delmar Ave., St. Louis 5, Mo.

ACTIVE OIL DEVELOPMENTS

SOUTHWESTERN ROOSEVELT COUNTY, N. M. One well drilling and 2 more ready to drill on powerful structure developed by major company seismograph surveys and subsurface control developed through wells drilled. Indicate major oilfield. Data furnished to lease and royalty buyers.

W. J. PETERMAN, Geologist
Portales, New Mexico

LEASE AND DRILLING BLOCKS

FOR SALE: 360 acres 13 miles southwest George West, Live Oak County, Texas. 120 acres cultivation, two water wells, house and good fences. 160 royalty acres, balance royalty expires 1960. Leases expire 1953 and 1955. Production and drilling two miles northeast and southwest. Price $125.00 per acre. Owner, W. H. Striebeck, Jr., Box 155, George West, Texas.

WILL pay cash instantly for leases (large blocks), royalties, mineral deeds, production. Write fully—P. O. Box 2153, Denver, Colorado.

FOR SALE: 400 acre oil lease in southeastern Kansas suitable for water flood. Bartlesville sand depth 700 feet has 9 producing wells. Box E-329, The Oil and Gas Journal, Tulsa, Oklahoma.

LOOKING FOR A LEASE? There will be over 40,000 wells drilled this year. If you are looking for a lease, drilling block, or drilling deal and haven't found it in this column, or if you have a lease or drilling block you want drilled, a Journal classified advertisement can find an interested party. See box heading for classified rates, or write The Oil and Gas Journal.

FINANCING

YOUR FINANCING PROBLEM can be solved at moderate cost. For details write Box E-241, The Oil and Gas Journal, Tulsa, Oklahoma.

REAL ESTATE

SPACE IS NEEDED: A Journal display classified advertisement is the quickest way to rent or sell your real estate. In the present period of expansion oil industry firms urgently need the space you have available. If it isn't listed here, you may also find it by stating your needs in these pages. For classified rates see box heading or write The Oil and Gas Journal.

LEGAL

U. S. DEPARTMENT OF THE INTERIOR, Bureau of Land Management, Washington 25, D.C. Notice is hereby given that 1040 acres in Ts. 2 and 3 N., R. 94 W., 6th P.M., Colorado, within the known geologic structure of the Wilson Creek field, Colorado, will be offered in two parcels for oil and gas leasing through competitive bidding to the qualified bidder of the highest cash amount per acre, at 1 p.m. Eastern Standard Time, on Sept. 12, 1951, when bids will be opened. Details of the lease offering, how and where to file bids and a description of the lands may be obtained by addressing an inquiry to the Manager of the Land and Survey Office, at Denver, Colorado, or to this office. Marion Clawson, Director.

LEGAL

U. S. DEPARTMENT OF THE INTERIOR, Bureau of Land Management, Washington 25, D.C. Notice is hereby given that the $NE^{1}_{4}NE^{1}_{4}$ (except the $S^{1}_{2}SE^{1}_{4}NE^{1}_{4}NE^{1}_{4}$) sec. 27, T. 32 S., R. 23 E., M.D.M., within the known geologic structure of the Midway field, California, will be offered for oil and gas leasing through competitive bidding, to the qualified bidder of the highest cash amount per acre, at 1 p. m., Eastern Standard Time, September 19, 1951, when bids will be opened. Details of the lease offering and how and where to file bids, may be obtained by addressing an inquiry to this office, Marion Clawson, Director.

LEGAL

U. S. DEPARTMENT OF THE INTERIOR, Bureau of Land Management, Washington 25, D. C. Notice is hereby given that 424.48 acres in T. 19 N., Rs. 103 and 104 W., 6th P.M., Wyoming, within the known geologic structure of the North Baxter Basin field will be offered in three parcels for oil and gas leasing through competitive bidding to the qualified bidder of the highest cash amount per acre, at 1 p.m., Eastern Standard Time, September 26, 1951, when bids will be opened. The details of the lease offering, how and where to file bids, and a description of the lands may be obtained by addressing an inquiry to the Manager of the Land and Survey Office, Cheyenne, Wyoming, or to this office. Marion Clawson, Director.

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Indiana Fields

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H. Ettejorg 1 Joseph, Military Donation 80-3n-9w, dry, TD 1,560 ft.

Posey County: Coy Oil Co. 1 Williams et al, SE SE SE 28-4s-12w, dry, TD 2,842 ft.

Sullivan County: Artnell Co. 1 Andre, NW NW NW 17-7n-8w, dry, TD 1,506 ft.

George S. Engle 1 Mann, SE SE SW 25-8n-11w, dry, TD 2,695 ft.

Vanderburgh County: Ryan & Sharp 1 Hasenour, NE NW NW 24-4s-11w, dry, TD 2,455 ft.

Vigo County: J. W. Everhart and Ashland Oil & Refining Co. 1 Kelly-Connelly, NW NW NW 11-11n-10w, dry, TD 2,097 ft.

Warrick County: G. L. Reasor 1 Ruddick, SW NW NE 19-5s-9w, dry, TD 2,236 ft.

WESTERN KENTUCKY SUCCESSFUL WILDCAT

Daviess County: Stanley Drilling Co. 1 Greer, SE SW SE 20-O-32, IP 2 bbl., Cypress 791-808 ft., TD 808 ft.

WESTERN KENTUCKY WILDCAT FAILURES

Henderson County: J. B. Buchman and C. E. O'Neal 1 Whitledge, 5-O-23, dry, TD 2,562 ft.

R. E. Hupp et al 1-A Elliott Toy, NW NW NW 1-O-24, dry, TD 2,525 ft.

G. L. Reason 1 Coffman, C NE NW 1-P-24, dry, TD 2,505 ft.

Union County: Ryan Oil Co. 1 Hancock, 22-P-21, dry, TD 2,722 ft.

EASTERN KENTUCKY WILDCAT FAILURE

Breathitt County: Jack Kindred et al 1 Edna M. Hurst, Boone Fork, dry, TD 1,547 ft., Corniferous lime 1,517 ft.

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Calling in a morning report by G-E radio to headquarters 25 miles away. Photo taken on a Reading & Bates, Inc. rig near Goldsmith, Texas.

To a driller, hours are dollars. In a normal week's operation, General Electric 2-way radio on a Reading & Bates drilling rig saves eight hours of shutdown time. This saving will more than pay for the cost of one mobile installation in 2 weeks!

When ordering supplies from the field, radio will eliminate useless travel time, increase the efficiency of your entire field operation. Mobile units in pushers' cars and homes keep them in touch with rigs 24 hours a day, permit close field control.

CALL YOUR G-E COMMUNICATIONS MAN

Ask him about General Electric's *narrow band* equipment particularly suited to the oil industry. You can reach him at the G-E office near you. Meanwhile, write us for free information kit. *General Electric Co., Section 891-6, Electronics Park, Syracuse, New York.*

You can put your confidence in—

GENERAL ELECTRIC

What more can we say?

Bill Duke, drilling superintendent for Lohmann-Johnson Drilling Company, watching a string of REED Super Shrink-Grip Tool Joints being applied at Plainville, Kansas.

LOHMANN-JOHNSON DRILLING CO., INC.
320 AMERICAN BUILDING
EVANSVILLE 8, INDIANA

May 17, 1951

Reed Roller Bit Company
P. O. Box 2119
Houston 1, Texas

Gentlemen:

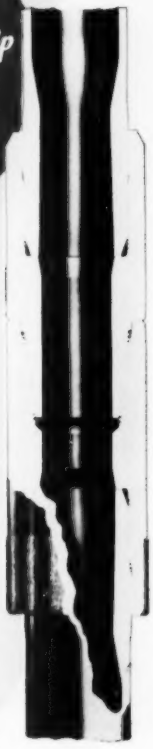
In answer to your question as to why we use Reed Super Shrink-Grip Tool Joints exclusively, I find there are at least four reasons which I will list:

1. Field replacement of tool joints saves us transportation costs and down-time.
2. We get longer service from drill pipe by reversing ends when replacing tool joints.
3. Your practice of pre-lubricating tool joint threads prevents galling.
4. We have never had a washout, thread failure, or other undue trouble from Reed Super Shrink-Grip Tool Joints.

All these reasons add up to the fact that your tool joints help us keep down drill string costs. That is why we use them.

Sincerely,
LOHMANN-JOHNSON DRILLING CO.
Bill Duke
William Duke
Drilling Superintendent

REED Super Shrink-Grip TOOL JOINTS



Keep down drill string costs with REED Super Shrink-Grip Tool Joints

REED ROLLER BIT COMPANY

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NEW YORK LONDON BUENOS AIRES

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Gulf Coast, Mid-Continent, Rocky Mountain and Canadian Distributor for Martin-Decker Products

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